

The

FEBRUARY, 1941

# TOOL ENGINEER

MACHINERY • PRODUCTION • TOOLS

**YOU CAN USE THESE FACTS  
ON VASCO FINE TOOL STEELS**

1  
**GRAY CUT  
COBALT**

2  
**NEUTRO  
FANTOM**

3  
**Air-  
Hard**  
AN OUTSTANDING  
NON-DEFORMING  
DIE STEEL

4  
**CROCAR  
AND  
O.H.O. DIE**  
TWO OUTSTANDING  
PRODUCTION  
DIE STEELS

5  
**RED CUT  
SUPER**  
AMERICAN INDUSTRY'S  
NO. 1 CHOICE  
FOR GENERAL  
CUTTING PURPOSES

6  
**VASCO  
OFFERS  
4  
TYPES OF  
DIE STEEL**  
FOR FAST ACCURATE  
SHAPING AND FINISHING  
OF HOT METALS

7  
**VASCO  
NON-SHRINKABLE  
AND COLONIAL 6  
Tough in  
Oil Hardening  
Die Steels**  
WHILE KRAFT 121 AND  
KRAFT 122 ARE ALSO

8  
**VASCO**  
TOUGH STEELS  
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9  
**E.V.M.**  
A SUPER HIGH SPEED  
STEEL

10  
**4 DISTINCTIVE  
CARBON AND  
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TOOL STEELS**  
FAMOUS FOR UNIFORM  
HARDENABILITY FINE GRAIN  
FREEDOM FROM SPONGINESS  
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STEEL CO., LATROBE, PA.

TM-140

# If Cars must become Tanks

shapes will change

*but the same Keller  
Machines will be on  
the job.*



*Above: Keller makes a profiling cut. Tracer following a metal template guides cutter through the production of four tank track drive sprockets simultaneously.*

*Left: Three stages of a Keller-made tank sprocket; peace or war, Keller is ready to speed up the work.*

AS American rearmament starts toward reality, fast footwork is required of industrial management . . . and of industrial production facilities. Life-saver for a tough situation in many plants is the Keller Machine, P&W basic tool whose function is "cutting two and three-dimensional shapes in metal."

The Keller is a mechanical-electrical hook-up through which a tracer passing over the surface of a model causes a cutter to reproduce the identical shape in any desired metal. The Keller was designed for primary use as a die sinker; but if cars must become tanks, versatile Keller Machines will speed into production of new dies . . . economically, accurately,

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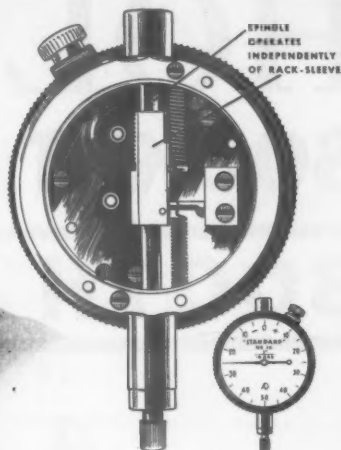
Invaluable additional service of the Keller Machine is its production of experimental parts in the actual size, shape, and material to be used in the finished part, directly from a wood or cement or plaster model. These parts can then be tested in use, analyzed, dissected.

Keller Machines cut down time and cost in getting a manufacturing program under way . . . an essential requirement in these fast moving days. Consult any P&W representative, or write to West Hartford for complete details.



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1544

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### BOOTH 156

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TRADE MARK  
**Socket Screws**



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# THE TOOL ENGINEER

"America in the Making"

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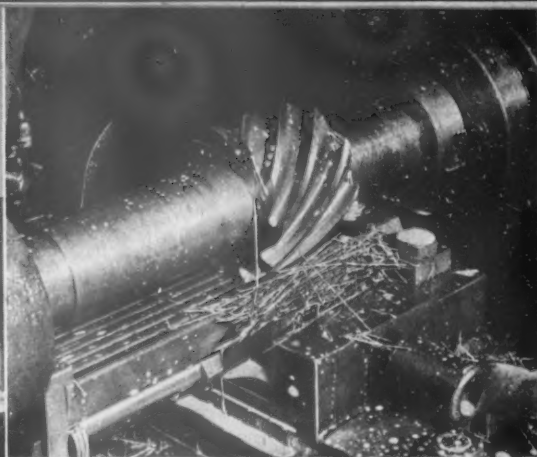
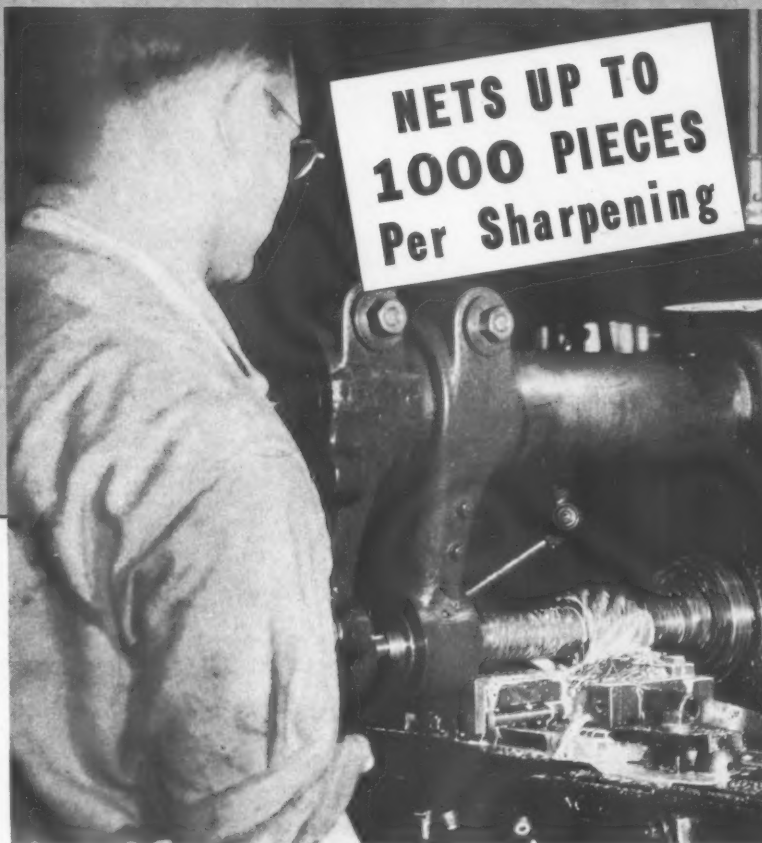
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THE TOOL ENGINEER

# "PARAFORM" HEAVY-DUTY SPIRAL MILLING CUTTER

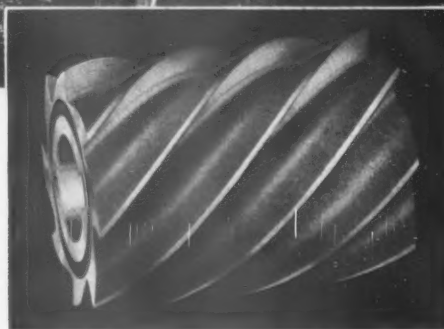
**NETS UP TO  
1000 PIECES  
Per Sharpening**



Your milling machines will produce more at lower cutter costs if you use Barber-Colman "Paraform" Cutters like the tractor builder in this case. Here, a standard "Paraform" Heavy-Duty Spiral Cutter slots steel shifter rails, ten at a time. The load cut is  $2\frac{39}{64}$ " x  $\frac{1}{8}$ " by  $3\frac{3}{4}$ " long. Floor-to-floor time,  $4\frac{1}{2}$  minutes. Production, up to 1000 pieces per sharpening.

Many manufacturers in varied lines are getting similar excellent results because "Paraform" Cutters have distinctive tooth form and uniform high quality. Discover the advantages of standard "Paraform" Cutters by trying them on your work.

Send us a trial order, or if you have a difficult job send the blueprint and receive the recommendations of our experienced Cutter Engineers without obligation.



This standard "Paraform" Heavy-Duty Spiral Milling Cutter, used on the above job, is shown on Page 71 of Barber-Colman Catalog K... one of the wide variety of standard "Paraform" Cutters carried in stock for immediate delivery. It will pay you to investigate where standard "Paraform" Cutters can be adapted to your milling operations.

## DATA ON THIS JOB

Name of Part — Shifter rail.

Material — M.D. 1040 steel.

Operation — Mill slot  $2\frac{39}{64}$ " wide by  $\frac{1}{8}$ " deep by  $3\frac{3}{4}$ " long through each load of 10 shifter rails, held in a special fixture.

Milling Machine — Kempsmith Maximiller.

Cutter — Barber-Colman "Paraform" Heavy Duty Milling Cutter.

Feed — 2.6" a minute.

Speed — 55 r.p.m.

Production Time —  $4\frac{1}{2}$  minutes per load, floor-to-floor.

Pieces per Grind — Up to 1000.

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General Offices and Plant 213 Loomis St., Rockford, Illinois, U. S. A.

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TE-F41

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## for every machining job

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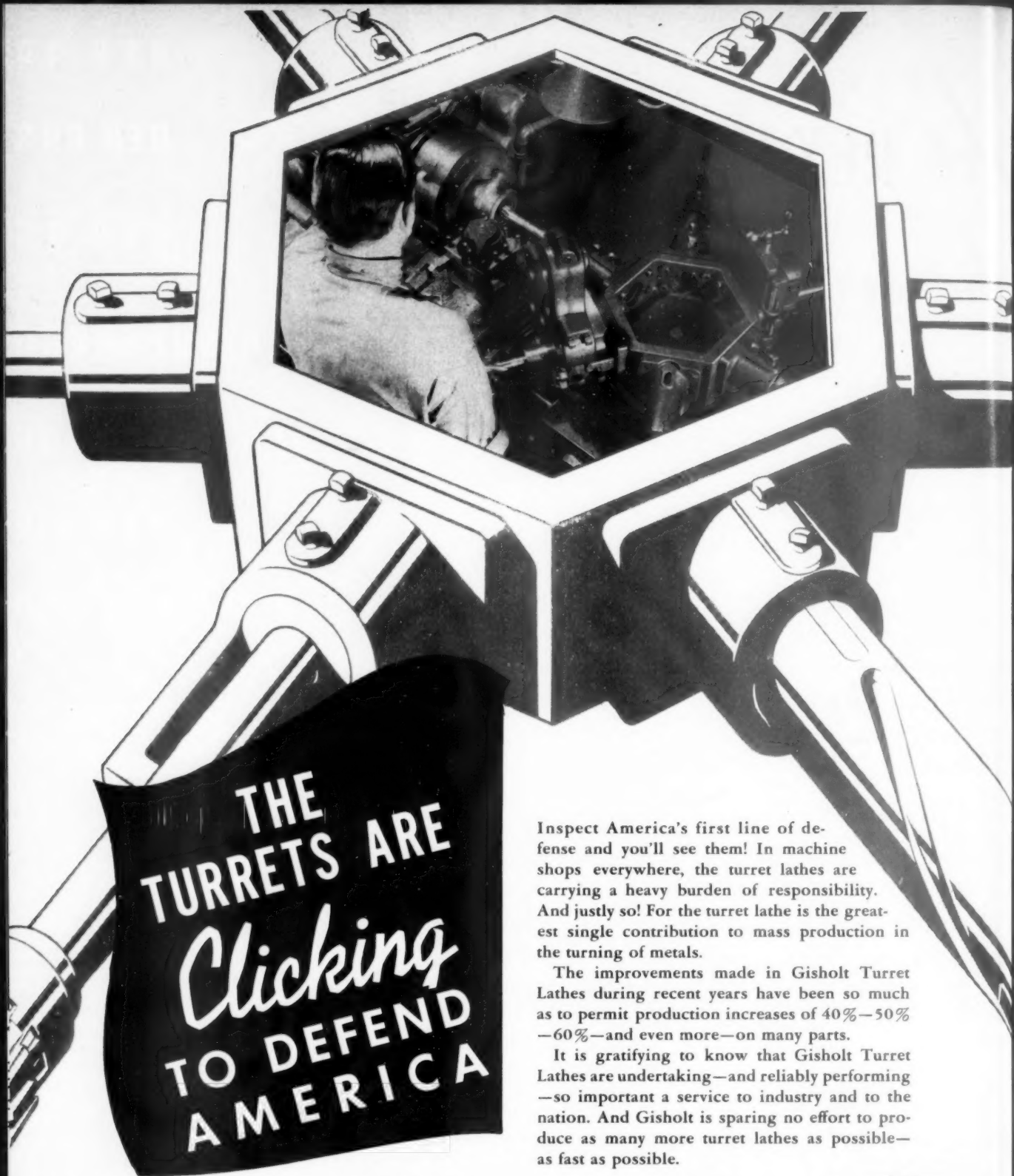
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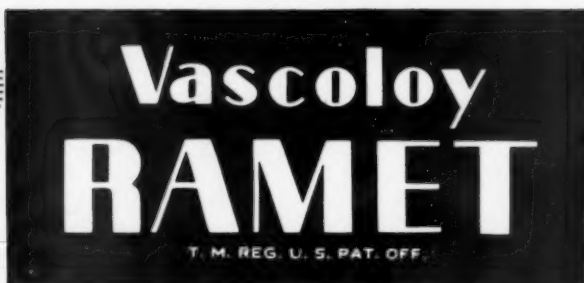
If you are one of the thousands upon thousands of tool makers who already have all or some of these time-savers, make sure you are using them to their fullest extent. If you don't have this information on hand—write us today. Except for the textbook, "Tool Steel Simplified," which costs \$1.00, all the literature shown will be supplied free to any tool steel user in the U. S. A. A penny post card will bring you your copies.

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Here, therefore, is no skimping of a gram or two of a rare metal to lower a price.

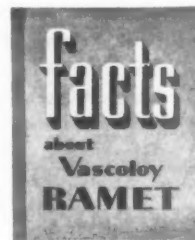
Here, an expertness in blending costly elements to produce combinations that will assure superlative performance.

Here, ample tool grades for roughing or finishing cuts on all materials. There are not one or two, but six Vascoloy-Ramet grades for cutting steel alone, plus other grades of the right strength and hardness for cutting any metallic or non-metallic material.

Here, a combination of Fansteel scientists, saturated with the complexities involved in making the best carbide tools: the standing and reputation of the Vanadium-Alloys Steel Company, the skilled sales engineering ability of the Vascoloy-Ramet organization and the broad experience of leading tool manufacturers.

These manufacturers, who are Vascoloy-Ramet agents, know how to apply Vascoloy-Ramet Tantalum-Tungsten Carbide Tools to tough steel and other metal cutting problems. You will find their recommendations invaluable and they can assure you early delivery.

The manual illustrated here will give you the background of Vascoloy-Ramet tools and blanks and will tell you how they provide the metal working industry with the best carbide tools obtainable.



### VASCOLOY-RAMET CORPORATION

*an affiliate of*

**VANADIUM-ALLOYS STEEL COMPANY**

*and*

**FANSTEEL METALLURGICAL CORPORATION**

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**Factory-Owned Branches:** Jersey City, Detroit, Cleveland, Pittsburgh, Cincinnati, Hartford, Providence, Philadelphia.

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**In Canada:** Carbide Tool and Die Company, Ltd., Hamilton, Ont.

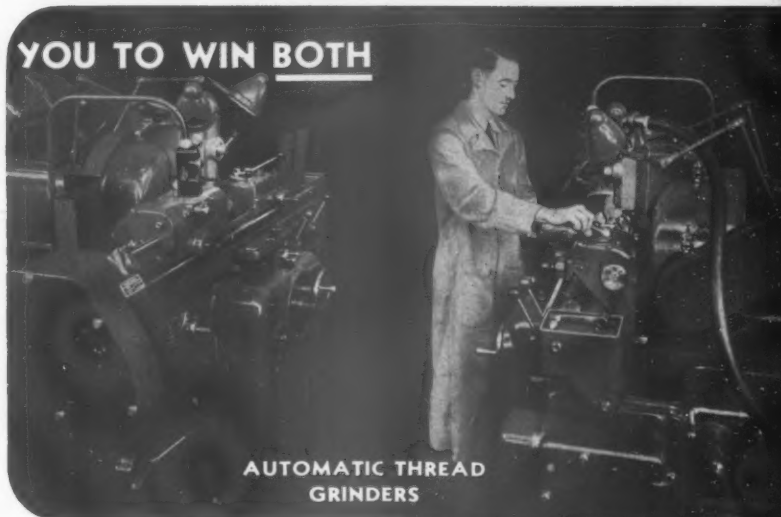


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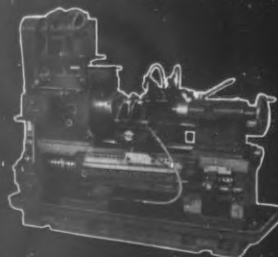
**JONES & LAMSON**  
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Manufacturers of Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-End Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers

RAM & SADDLE TYPE UNIVERSAL TURRET LATHES



FAY AUTOMATIC LATHES

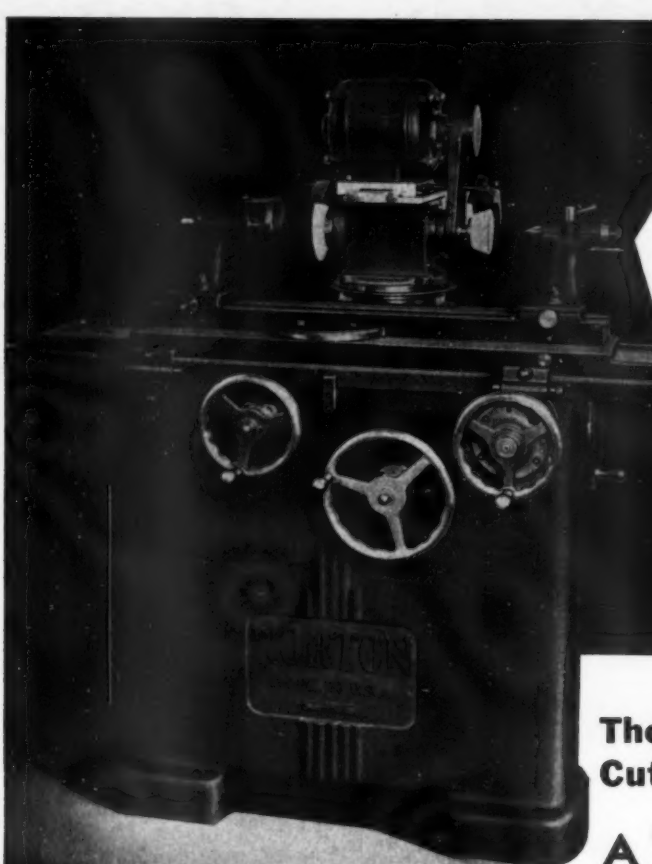


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Specially designed to get the most from end  
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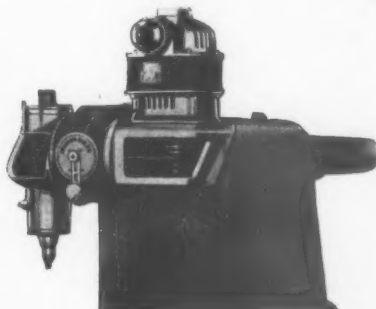
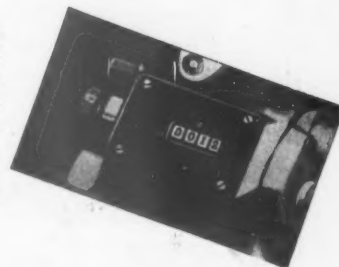
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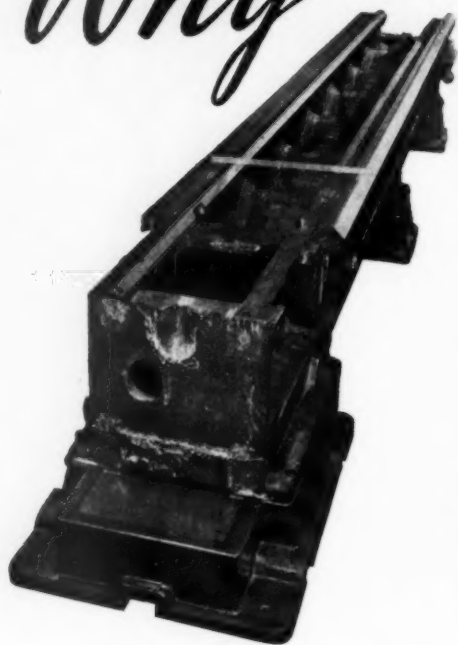


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# Why

## AXELSON LATHES SAFEGUARD SCHEDULES

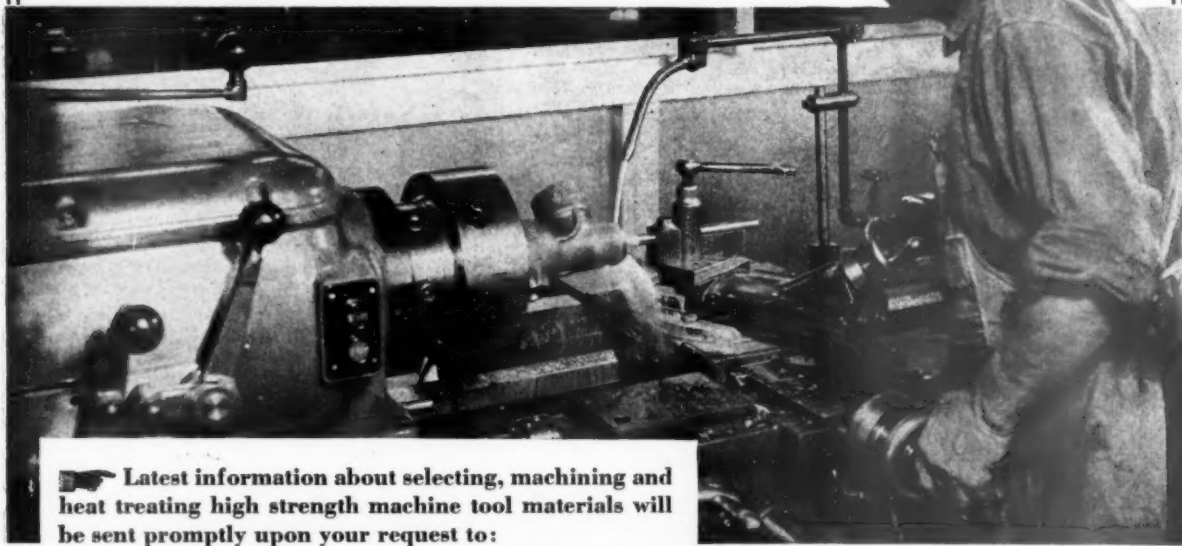


Confronted by a "terrible urgency", makers of machine tools are rapidly turning out improved equipment that can meet speeded-up production schedules. This 24-speed AXELSON lathe pictured below, for example, handles heavy rough cuts or precision finishing quickly and accurately. To maintain accuracy in high speed production, Axelson casts the lathe bed in a wear-resisting Nickel-chromium-molybdenum iron. Tensile strength above 50,000 psi and high elastic modulus—characteristic of Nickel alloyed cast irons—assure perfect alignment through years of hard usage. For strength where the stress comes, AXELSON MFG. Co., Los Angeles, uses a rigid foundation of Nickel alloyed cast iron.

# NICKEL

CAST IRONS ★ ALLOY STEELS

16" Axelson threading a Nickel alloy steel crankshaft for a Menasco aircraft engine. "It's the finest lathe in our shop," says a superintendent. "We never have any trouble with it and it handles any kind of cutting with almost no comebacks." For toughness to overcome shock overloads and withstand fatigue, Axelson spindles, shafts and gears are Nickel-molybdenum steels.



Latest information about selecting, machining and heat treating high strength machine tool materials will be sent promptly upon your request to:

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET  
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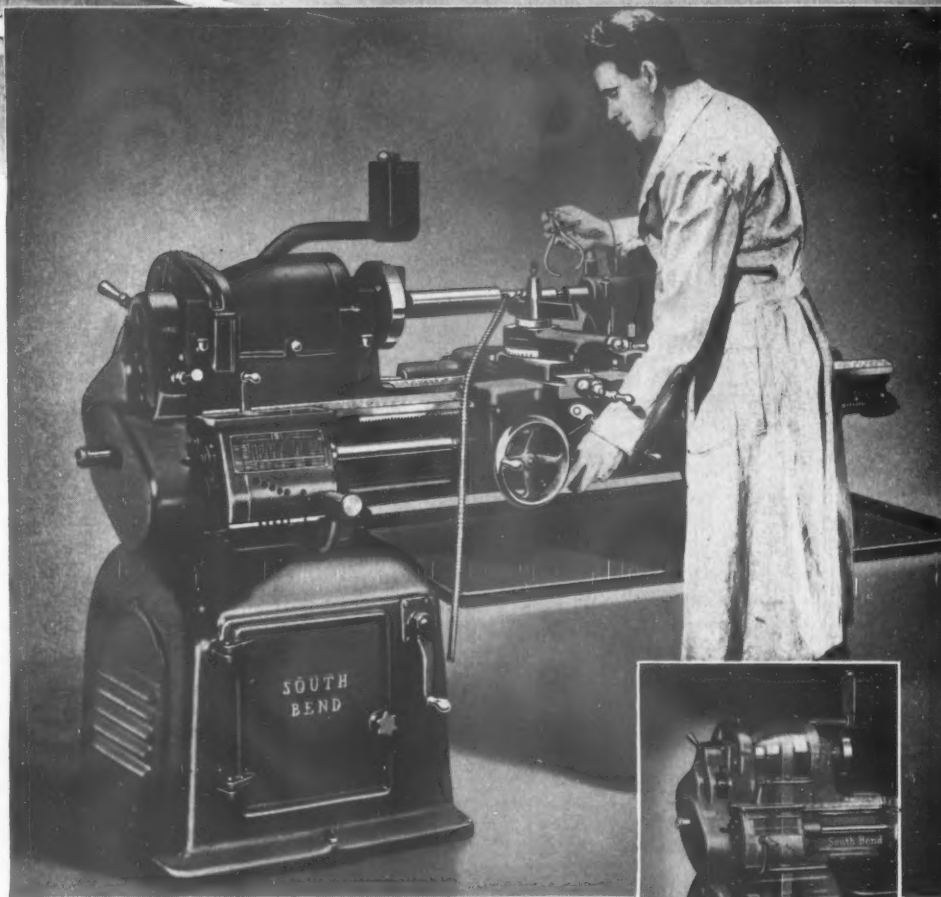
THE TOOL ENGINEER



# Streamline

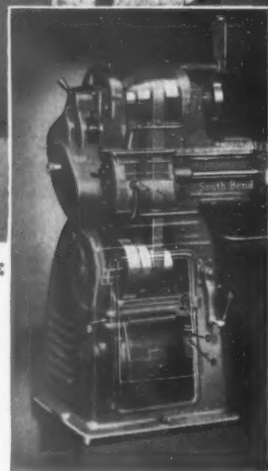
## YOUR SHOP EQUIPMENT

**HUNDREDS** of nationally known manufacturers have selected South Bend Lathes when streamlining their shop equipment to meet present day needs. Ease of operation, speed, power, accuracy and efficiency are some of the features responsible for their selection. Substantial savings in capital investment, power consumption, floor space and labor costs have resulted from their installation.



14 1/2" SWING x 6' UNDERNEATH MOTOR DRIVEN SOUTH BEND LATHE

The South Bend Underneath Belt Motor Drive provides an unusually wide range of spindle speeds. The direct belt drive to the spindle assures smooth operation, free from vibration, even at high speed. When slow speeds are required for machining large diameters, a wrenchless bull gear lock permits engaging the back-gears quickly. This fully enclosed drive is compact, silent in operation, trim in appearance, powerful and economical.



Phantom view of direct drive



### SOUTH BEND LATHE WORKS

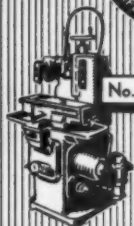
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# Sundstrand Works For Peace



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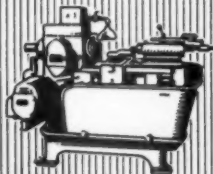
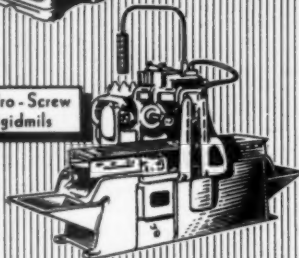


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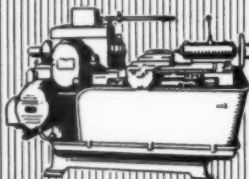
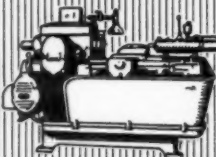
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Hydro-Screw Rigidmils



Model 8 Automatic Stub Lathe

Model 10 Automatic Stub Lathe



Model 12 Automatic Stub Lathe



Tool Grinders



## Automatic Stub Lathe Turns 1000 Different Bushings

The Automatic Stub Lathe illustrated turns, faces, and bores 1000 different sizes and types of bushings. Easy to set up and change over, it improved production wonderfully immediately after installation. Other Automatic Stub Lathes are equally successful on thousands of different work-pieces handled in small, medium, or large lots on a high-production basis. The features and advantages of Automatic Stub Lathes . . . and other Sundstrand machine tools . . . that produce profits in commercial service, also work for peace by increasing output, saving labor, and speeding completion of defense equipment.

Our organization is working at top speed, plant capacity scheduled in advance. Nevertheless, our Engineered Production Department is always available for developing applications of Sundstrand machine tools to commercial service or defense equipment manufacture.

**Sundstrand Machine Tool Co.**  
2532 Eleventh Street, Rockford, Illinois, U. S. A.

## RIGIDMILS-STUB LATHES

Hydraulic Operating Equipment — Centering Machines — Tool Grinders



Booklet shown above tells why Sundstrand Automatic Stub Lathes are so easily set up, so highly productive, durable, and economical. Pictures, diagrams and specification tables make it easy to read quickly. Get your copy today. Write for Bulletin 391.



Every member of our organization gladly makes this vow:

"I pledge allegiance to the Flag of the United States of America and to the Republic for which it stands, one Nation indivisible, with liberty and justice for all."

# P & J AUTOMATIC CHUCKING MACHINES take on the Tough Jobs in Tank Manufacture . . .

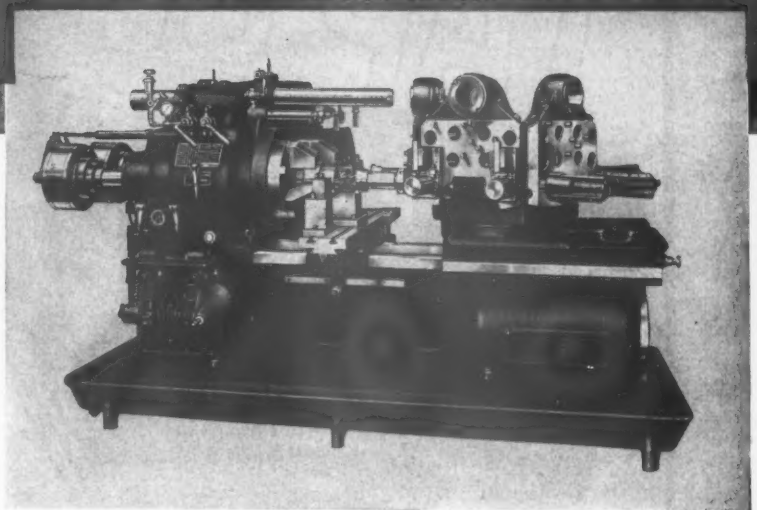


Photo by U. S. Army Signal Corps.

Tough materials, large work, close limits of accuracy—even under these conditions the building of tanks and tank engines demands speed and production efficiency of the highest order. The design of P & J Automatic Chucking Machines and their rugged construction offer literally hundreds of possibilities for the improved production of tank parts.

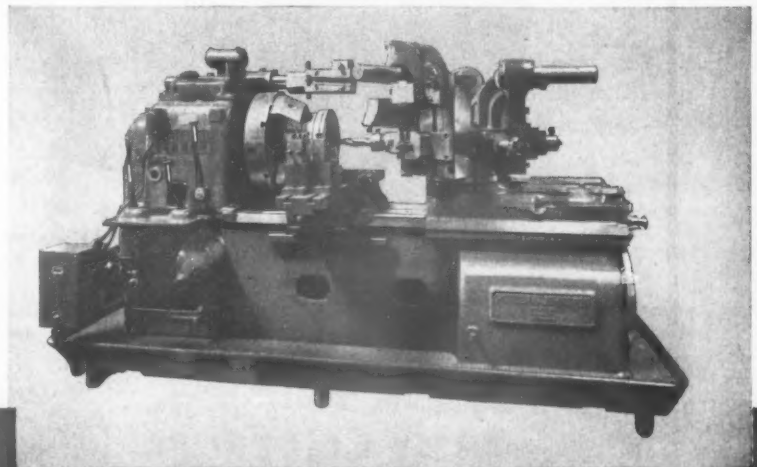
P & J headstock, turret and slide units are of ample dimensions, easily tooled and capable of handling large work with increased efficiency. P & J automatic speed and feed changes permit one operator to handle a battery of machines, resulting in divided labor costs and less operator fatigue. Finally, P & J Engineering Service gives sound advice and suggests improved tooling and methods in every field of manufacture connected with the building of nation's armaments.

New Bulletins give detailed specifications for the entire line of P & J Automatic Chucking and Turning Machines, including the latest 2-spindle 5D-2-9" Machine illustrated above. Write for a complete set of Bulletins, mailed at no obligation to you.



Above: The 5D Power Flex 2-spindle model Automatic Chucking Machine. Unique construction provides an increase in output per square foot of floor space . . . conservation of power . . . moderate initial investment.

Below: P & J Power Flex Automatics are the leading automatics of the single spindle type. Features: Four automatic changes of feed . . . three selective automatic changes of feed . . . makes all automatic changes while under cut.



## POTTER & JOHNSTON MACHINE COMPANY, Pawtucket, R. I.

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for MODERN PRODUCTION

A one piece tool for driving taps in any machine  
or attachment having a Morse Taper Hole...  
Also furnished in American Standards  
Association Taper—Generally used by  
Automotive Industry, Machine  
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# SUNNEN *Precision* HONING MACHINE

## Provides a New Solution to the Problem of Accurately Finishing Internal Cylindrical Surfaces!

### *A Few Typical Uses*



Stone Lettering Air Hammer "Sunden honing does in five minutes what it took 20 minutes to do by lapping."



"Produced an extremely accurate and glass-like finish."

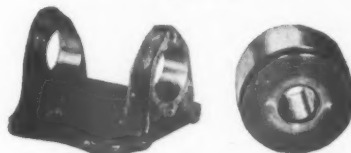


Miniature Model Airplane Cylinders "Eliminates expensive machine set-up."

Drill Jig Bushing "Increases sales appeal of product."



Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .0005 in."



"Strict alignment maintained between two holes."

Drawing and Blanking Die "Saves time in producing smooth base metal finish."



"A perfectly straight round hole with a mirror finish."



★ Manufacturers—particularly those engaged in the defense program—are welcoming the Sunden Precision Honing Machine. Many of them have said that they are amazed to find that such an inexpensive piece of equipment can produce such accurate work.

Here in one simple, practical, inexpensive machine is the answer to the problem of accurately sizing and finishing internal cylindrical surfaces from .245" to 2.400" in diameter.

It does not require a skilled machinist! Any intelligent workman with a few hours practice can produce a super-smooth surface finish and hold accuracy to one ten-thousandth.

The Sunden Precision Honing Machine can be set up and work located in less than one minute. Three point design of the mandrel using one cutting stone is guaranteed to correct taper and out-of-round holes.

It is ideally suited for assembly operations, production, tool room and experimental use, repair and salvage work and maintenance operation.

Hundreds of manufacturers of such parts as gauges, drill jig bushings, bearing races, automatic machinery, hydraulic cylinders, gears, valves, gyroscopes, instruments, pump parts, etc., are using this Precision Hone to their advantage.

### SUNNEN PRODUCTS COMPANY

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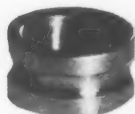


### *Write for FREE Bulletin*

This new 8-page bulletin will give you complete information—or if you prefer a Sales Engineer will be glad to call with his demonstrator and demonstrate what this machine will do for you.



Rubber Eraser Extrusion Die "Tripled life of extrusion dies."



Inner Bearing Ring "Accurately removes last 'tenth' of stock."

# Precision Cylinders

## Stronger, Simpler, Easier to Use

Better use of hydraulic power is available with Hannifin patented no-tie-rod design hydraulic cylinders. This design gives a stronger cylinder assembly, simpler to use, assuring high efficiency operation. Special mirror finish honing produces a cylinder bore that is straight, round, perfectly smooth—assuring high efficiency piston seal with minimum fluid slip. No-tie-rod design allows end caps to be positioned independently to bring inlet port at top, bottom, or either side. End caps may be removed without collapse of other parts or disturbing the cylinder mounting. Air vent plugs on three sides of each cap allow for a vent at the top when inlet port is at either side or bottom.

Seven standard mountings simplify applications. These cylinders are available in a full range of sizes, for any length stroke, with small diameter piston rod, 2 to 1 differential piston rod, or double end piston rod. Write for Bulletin 35 with complete specifications.

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Detroit Representative: R. A. Bean, Hayward Building  
4829 Woodward Avenue • Telephone Columbia 4949



# HANNIFIN HYDRAULIC CYLINDERS



## When Reason Is Gone

**I**F YOU would like to spend an amusing half hour sometime, get out the records of your local city ordinances and read over those passed more than ten years ago. Many of them will now seem ridiculous and you can enjoy a quiet laugh at the consternation which would be caused were they to be enforced today.

There was a reason back of every one of those ordinances when they were passed, and in most cases it was a good reason. But as the years went by conditions changed and the reason disappeared. Unaffected by changing conditions, the law remained on the books, theoretically as powerful as ever. Since it is much more difficult to repeal a law than it is to pass it originally, enforcement relaxed and ordinances were just forgotten.

This same situation will be found to prevail in some state and national legislation with one fundamental difference: As you progress up the scale the legislation becomes more important and hence the hidden power of forgotten laws becomes more potent.

In the dark days when Franklin Roosevelt first took office he did not feel that there was time to seek from Congress the powers he wanted to use in dealing with the crisis. He checked back thru the years until he found on the books unrepealed, but forgotten, laws giving him the powers he needed. It was then only necessary to invoke these laws in order to have the powers desired.

As Bill Number 1776 (the Lend-Lease Bill to Aid Britain) nears passage it is important for us to remember these facts. It is important for us to realize what tremendous power this Bill, and others Congress will doubtless enact before this war is over, confers upon the President.

There is little chance of ever repealing such acts. Let us rather safeguard our democracy through insertion of a time limit in every such bill which is passed. Let us have the foresight to see that the powers do not remain after the reason for granting them is gone. Only in this way can we protect America from the possibilities of a dictatorship which might result should we, in some future election, place in office an unscrupulous man who invoked the powers for personal rather than national gain.



## PRODUCTION: *Up 50%*

A certain New Jersey manufacturer reports this very good saving in tapping costs. This screw machine is turning out a part made of  $3\frac{1}{2}\%$  nickel steel. Tapping a  $\frac{1}{4}$ -24 hole was the "bottleneck" of the job until they switched to "G. T. D. Greenfield" Taps. The solution recommended was a roughing cut with a "Gun" Tap and the last .010 of an inch removed by a  $\frac{1}{4}$ -24 High Speed Steel Ground Thread "G. T. D. Greenfield" Tap. Production on the whole job jumped 50%.

To manufacturers everywhere who must use every possible means of increasing production, we say—"Have you thoroughly investigated 'G. T. D. Greenfield' Taps? —Ground Thread High Speed Steel for fast, accurate work; 'Gun' Taps for 'through holes'; 'Maxi' (the special surface treatment) for stringy or abrasive materials." "G. T. D. Greenfield" Engineers will arrange a test at your convenience.

**GREENFIELD TAP & DIE CORP., GREENFIELD, MASS.**

Detroit Plant: 2102 West Fort Street  
Warehouses in New York, Chicago, Los Angeles, San Francisco  
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**GTD GREENFIELD**

TAPS - DIES - GAGES - TWIST DRILLS - REAMERS - SCREW PLATES - PIPE TOOLS



# Better Methods

## Start with the Tool Engineer

By GUY J. BATES

Supervisor of Methods, Inland Manufacturing Division  
General Motors Corp., Dayton, Ohio

**I**N the past the Tool Engineer has had a poor opinion of "motion study" as a practical tool to be used for everyday design problems. His attitude has not been without foundation. Micromotion study with its therebligs, simo-charts, and other specialized analysis procedures has required the interpretation of a skilled analyst. Recent developments in the field of methods study, however, have brought into use a new technique of operation analysis that can be profitably used by the Tool Engineer in his daily work.

To better understand the nature of this new technique let us draw an analogy with an example common to all our experience. Suppose we have before us a part and a blue print. We are asked to

check the physical dimensions of the part against the print. The first tool we would request would be a measuring device. In the case of the part, it would be a scale and a pair of micrometers. The new technique of operation analysis is a similar device, a measuring stick, by which the effectiveness of an operation in the shop may be judged with reference to its use of labor.

When the methods engineer approaches an operation in the shop for the purpose of measuring the effectiveness of the labor utilization, he uses the new technique of operation analysis and observes the muscular movements of the operator. Through his observations of the muscular movements required by the worker to

perform the cycle of the operation, he is able to judge the effectiveness of the workplace layout, the tooling, and the training of the operator.

The methods engineer has made considerable progress in improving existing operations in the plant. Intensive training programs have been instituted to train plant supervisors in this technique of operation analysis. The results have been most gratifying. The combined efforts of the plant supervisor and the methods engineer have materially reduced waste effort in the plant.

Unfortunately, this approach to better methods is basically wrong. It contains too much of the element of "locking the barn after the horse is stolen." The solu-

It is putting the cart before the horse, thinks Guy Bates, to worry about motion study after a machine is put in operation. He firmly thinks that it should be done while the machine is being designed. Below are twenty questions he feels every machine and fixture designer should ask:

1. Is the job safe for the operator?
2. Is there sufficient leg room so the operator can operate the equipment while seated?
3. Is the work level slightly below elbow level when the operator is standing?
4. Does the design permit loading of the fixture without "change control"?
5. Does the design permit unloading of the fixture without "change control"?
6. Is the work equally distributed between both hands?
7. Can a mechanical ejector be used to remove the piece from the fixture?
8. Have all barriers been eliminated from the movement path?
9. Can a foot pedal be used to free the hand for other useful work?
10. Have bullet-nose pins, guides, or bellmouths been provided to reduce "lining up" movements?
11. Have mechanical holders been provided to eliminate the operator's hand as a holding device?
12. Are all control levers centralized and within normal work area?
13. Are all levers "quick acting"? (Toggles and cams instead of screw clamps.)
14. Can control levers be designed to serve multiple functions?
15. Has sufficient chip clearance been provided?
16. Can chips be washed or blown off automatically?
17. Has fast feed to, and return from, the cutting point been provided?
18. Has the design provided for simple change over to reduce set-up time?
19. Will the upkeep of the fixture be low?
20. Has the fixture hourly output been adjusted to the "line balance"?



tion of this problem lies within the scope of the Tool Engineer. It is he who controls the design of the original tool before it arrives in the production department. If he supplies a well designed tool we have the most effective labor utilization. On the other hand, if the tool is poorly designed we have two obvious losses. First there is the redesign and rebuilding cost, and second there is the added labor cost of operating poorly designed tooling workplaces until the improved steup can be provided.

This condition is recognized by some of our farsighted Tool Engineers. For example in the TOOL ENGINEER for June 1939, J. R. Weaver in his article, "Why Buy New Machine Tools", writes as follows: "A great deal has been done by

the machine tool manufacturer to build his machine more rugged in order to be able to increase speeds and feeds. It seems, however, that he has overlooked a most fertile field. This condition can be improved I believe by a thorough study of loading and unloading methods, proper location of feed and speed changing levers, development of methods of changing feeds and speeds more quickly with less fatigue, and improvement in the method of setting up tools."

Mere recognition of the problem is not enough. The time is rapidly approaching when the Tool Engineer is going to be held accountable for the design of his tooling from a labor utilization standpoint. The tooling must still produce the part to print, but no longer can the tool

designer stop there. He must, in the future, consider the movements required of the worker to operate the equipment, and reduce them to a minimum.

Management is beginning to recognize the fallacy of the old approach, of improving the job after it is running in the shop. As the plant supervisor becomes better equipped through methods training, to spot poorly designed setups, greater pressure is going to be brought to bear on the tool designer. In the future movement economy must be *designed* into new equipment.

Tooling should extend man's ability to produce. It is, therefore, only logical that we approach the problem of designing equipment from the standpoint of the conservation of human energy.

## Here Are Some Ways to Build Movement Economy Into Tools

1. Replace hand movement by automatic movement.
2. Replace hand movement by foot movement.
3. Eliminate the passing of work from one hand to the other.
4. Provide hand levers, etc., with multiple functions.
5. Provide means for finished work to drop from fixture into discharge chutes.
6. When drop discharge cannot be used, arrange for disposing directly in front of operator, over top of machine is often a good solution.
7. Arrange for getting new work from hopper or chute as close as possible to whenever discharge point so as to overlap movements.
8. Eliminate the use of the hands as a holding device.
9. When possible keep hand movements within radius of forearm from elbow height up and away. In all events keep within radius of full arm without body bent or twist and without necessity for stepping to reach point desired.
10. Eliminate barriers so that movements can follow shortest path.
11. Keep both hands busy with useful work and avoid wait of one hand.
12. Provide double station fixtures.
13. Eliminate hard to find controls such as small buttons which require eye directing.
14. Aid locating by means of slides, guides, flanges, stops, bell mouth, holes and bullet nosed pins.
15. Separate scrap from good parts.
16. Keep eye movements within small space, about six inch circle.
17. Avoid necessity for operator assuming uncomfortable position. Most of work should be at elbow level.
18. Build controls of proper size, shape, and weight and build to operate without undue effort.
19. Build foot pedals so that they may be operated with comfort by either foot.
20. Where feasible, arrange so that machine can be operated equally well from standing or sitting position. This is best accomplished by arranging to work at elbow height when standing, then provide high posture chairs so that operator may sit and still work at elbow height. When foot controls are used, it is generally necessary to provide upper and lower pedals.
21. Provide definite location for loose tools. Mount if possible in position for use to require as little handling as possible.
22. Make all controls "quick acting". Use toggles or cams instead of screw clamps.
23. Design machines for loading so that those tools such as pliers, tongs, etc., do not have to be used to place the parts in fixture.
24. Where possible, levers such as feed handles on single spindle drills should be made reversible so that they can be operated by either the right or left hand.
25. Design machines as much as possible to shed oil dirt by eliminating flat horizontal surfaces.
26. Provide sufficient place for chips and turnings and make these places easily accessible for clean out.
27. Provide sufficient toe space to allow operator to stand up to machine as he should.
28. Provide compound lines large enough to keep chips and turnings washed off fixtures to relieve operator from having to brush or blow off.
29. Provide for easily simple and quick tool changes and set up change.
30. Provide for fast feed of tools or carriages up to work and fast return to unloading point.
31. Make the job safe for the operator. Do not sacrifice safety for motion economy but strive for both.

# Bugs

General recommendations for those still unfamiliar with the widening field of hydraulic appliances.

## *In the Oil Line*

By A. E. RYLANDER

Supervisor, Special Equipment Design  
Midland Steel Products Co.  
Detroit, Michigan

WHILE hydraulic appliances are gaining in favor among Tool Engineers and production executives, users may encounter considerable minor annoyance rather than extreme faults in design or manufacture. While the basic principle of hydraulic action is as old as nature itself, its application to mass production is a comparatively recent innovation. Yet, hydraulic equipment, as pumps, cylinders, valves and so on, is about as good as can be expected at this stage of the game, and if anything, is in a more advanced stage than the automobile, years of development taken into consideration. Besides, improvements are coming along at an accelerating pace, and we may look for continued progress and refinement as demand increases.

The writer would stress, at this point, that comments in this writing, are general, and that criticism and recommendation is advanced with a view toward provoking interest and discussion. The writer's aim is to point out faults in design and installation of the ordinary, low cost, commercial units most commonly used and, by effecting improvements, promote use and demand. Certainly hydraulically operated tools and machines have

much to recommend them. They are quiet, positive, and convenient, besides, have the advantage that they take up comparatively little floor space in themselves while pumps can be installed in pits or on mezzanines. While a cylinder or valve may fail occasionally, replacements are fairly cheap and change quickly effected, hence, production schedules are not seriously delayed.

However, there is the fact of occasional failure, (true also of purely mechanical units) when a user may condemn a line which is essentially well designed and carefully manufactured. But, if he changes to another make, he may run into other "bugs" which are as annoying with the result that, on future developments, he may favor the mechanically operated device rather than the hydraulic. One "bug", inherent to a greater or lesser degree in hydraulic cylinders is leakage at the joints. It is my belief that all manufacturers of hydraulic equipment have gone to extreme pains to eliminate

leakage, or at least, to reduce it to a practical minimum. To expect absolute non-leakage is unreasonable, since that would imply that piston rods run dry in the packing glands. But, a reasonable absence of leaks should be expected. To effect this, there will be required some study and experimentation between makers of cylinders and manufacturers of packings, as well as the cooperation and consideration of the users. In the final analysis, the user is the greater beneficiary; demand proves the desirability of hydraulic operations are sometimes extended to meet the desires of the buying engineer. Remember, here, that the streamlined automobile did not become fact until we had created the machinery to make it. Let us criticise constructively, but be considerate in our expectations.

Of course, it can be contended that there are cylinders on the market which are practically leak-proof, and the writer concedes this point. Taken as a whole some cylinders are excellent, the most good, but in the writer's experience (and it has been considerable) even the best will fail nor is failure necessarily due to skimping or neglect on the part of the maker. For example, a maker may decide

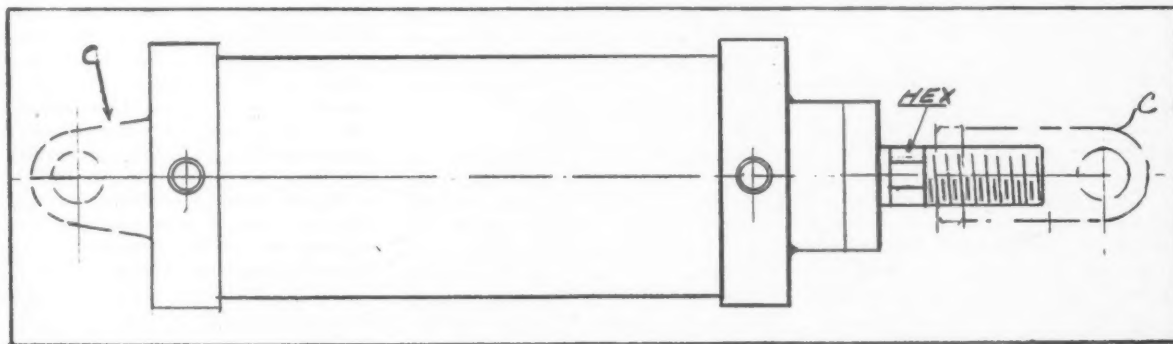


Figure 1

to heat treat an alloy steel cylinder, already adequately strong, to render it even stronger. A hardening crack may develop which, while it may not show up in a test, will open and emit oil after a period of use. In a case of this sort the maker should be commended for good intentions, not criticised for a failure which just happened.

One thing which may be overlooked by the maker is that the application may induce stresses which are in excess of the rated load of the cylinder. For instance, a cylinder rated at 1000 lb. pressure p.s.i., and actually loaded to but half its rating, may be used to actuate a lever which, carrying a heavy weight that may be suddenly arrested, will literally tear loose from clevises or mounting brackets. In this connection the writer suggests that cushions, as now designed and applied, are not adequate; cushions should be augmented with extraneous dashpots and

hex will appeal to the user. It will be more "mechanical". Whenever application permits (and this will be found the rule, not the exception) rods should be threaded on the outside for maximum strength. In the earlier days of hydraulic application, the writer suffered considerable annoyance, not to mention expense to the employer, from screws breaking off in the internally threaded rods. This despite that screws were made of the toughest alloy steel available.

Clevis pins should be fairly large; in the writer's opinion, not less than 1" diameter for a 2" dia. bore cylinder designed for 1000 lb. pressure, proportionately larger as pressure or bore increases. It would be highly desirable that cylinders be standardized, for interchangeability. As it is, competitive makes have different rod diameters, different threads and various lengths, enough difference so that considerable and expensive redesign

for operation. On the other hand, tool designers are constantly fighting for dimensions, for the room in which to install appliances; in such cases the smaller cylinder and higher pressure is the logical choice. In applying, however, the stroke of cylinder should be greater than stroke used, so that piston need not travel full length of bore and, as a result, hit the cylinder heads. The recurrent shock may loosen the joints and cause leakage past the gaskets. If one end of a cylinder must be used for a stop, rather than that extraneous, adjustable stops be provided, then stop against the blind head with the shortened stroke toward the rod end.

One factor in leakage is that, with incessant operation, the oil in the system becomes heated, reducing its viscosity. A thin oil will seep past a packing or gasket quicker than a heavier bodied fluid. Various expedients are resorted to to keep down temperatures; one is to install a cooling coil in the pump tank. This, however, means disposal of water and entails provisions for drains. Yet, a 30 gallon range boiler, disposed vertically beside the pump and with the return coming in at the top, will not only provide radiating surface but, due to larger volume, reduce heat. As previously suggested, pumps may be disposed on mezzanines or in pits; in the first case, shutoff cocks should be provided so as to eliminate need to drain system should a cylinder or valve have to be removed. Naturally, drain cocks should also be provided. When placed in pits, the breather cap should be replaced with a gasketed cover and a standpipe, higher than highest appliance used, should be installed.

It may be desirable, at times, to operate various banks of cylinders from one pump, on intermittent cycles. It will be found that when one group of cylinders is under pressure, and another group suddenly applied, that there is a momentary drop in pressure in the first bank until the pressure equalizes. To maintain pressure, it is only necessary to install check valves between the operating valves and the group line or manifold, naturally seeing that there is no stricture on the return or exhaust lines. In this connection, it is advisable to use the lately developed hydraulic tubing and fittings in preference to commercial heavy pipe. It costs more but is worth the difference, is actually cheaper in the long run. Hose, too, has been refined until it is extremely strong and durable; preferably, connections should be put on by the manufacturer, the correct lengths specified by the buyer. These are general recommendations, for consideration of the manufacturers of hydraulic equipment as well as for designers who have but slightly broached the use of hydraulic devices. In a widening field, however, application will gain in favor.

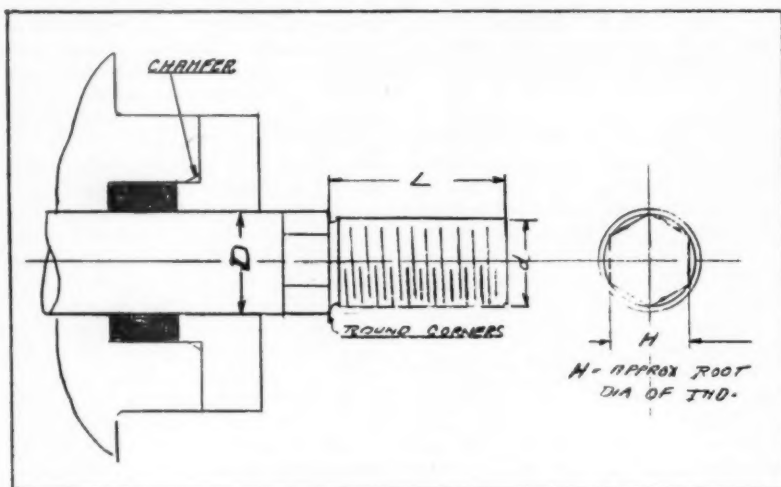


Figure 2

even rubber bumpers. Also, cylinder heads, especially those with integral clevis, (C, in broken lines, Fig. 1) should be made of steel, with steel clevis on the rod. Cast iron will break, if not from overload then from shock.

Thought should also be given to replacement in the field, since repairs cannot always be made by skilled mechanics. It would be well, therefore, if the threaded diameter of piston rod be made smaller than rod proper, to prevent scoring of packings when repacking. Also, it were a good idea to chamfer the gland packing bore, for easy entry of packing. The cap will close the chamfer. (See Fig. 2) The writer would also recommend that a hexagon be milled on the rod, just clear of the packing gland cap and between it and the thread, so as to obviate the use of pipe wrenches when screwing on nut or clevis. A score from a pipe wrench may easily damage the packing and cause a serious leakage; besides, the

may be necessary should a user decide to replace a cylinder with one of another make. There is no valid reason why cylinders should not be standardized, while yet leaving each maker free to provide "specials" which may have extra, desirable features. Consider that ball bearings have been standardized for years without materially affecting user preference; if anything, standardization has enhanced the quality of ball bearings generally and has had a very favorable effect on the ball bearing industry as a whole.

As previously intimated, there must be cooperation between the maker and the user if hydraulic applications are to work satisfactorily. The best equipment will fail if improperly applied. There is a temptation, especially when tooling budgets are scaled down, to use equipment on the skimpy rather than the ample side. The larger the cylinder, obviously the lesser the pressure required



## Show Officials Are Practical Production Men

Executives and engineers of companies now tooling up for defense are officials preparing for the forthcoming National Machine & Tool Progress Exhibition and convention of the American Society of Tool Engineers, sponsors of the exhibition. The chairman of the exhibit committee which is responsible for approving all exhibits, especially from the stand-



**Chairman Smila**  
Approves the exhibits.

point of their interest and value to national defense production, is Frank Shuler, general master mechanic of the Chrysler Corporation, Highland Park plant. Cooperating with him on this committee are Frank Crone, chief tool designer of the Lincoln Motor Car division of the Ford Motor Company, William A. Smila, master mechanic of the Chrysler Division of Chrysler Corporation, and Luke E. Beach, master mechanic, Detroit Transmission Division of General Motors. Mr. Crone is also national treasurer of the Society.

Responsible for the program for the Tool Engineers convention, to be held concurrently with the exhibition, are James R. Weaver of the Westinghouse Electric and Manufacturing Company, Walter Wagner of Lincoln Motor Car Division and Homer Bayliss of the Motch & Merryweather Machinery Company. Clyde Hause of the Gorham Tool Company is in charge of plant inspection trips and transportation.

Ford R. Lamb, Executive Secretary of the A. S. T. E., is general manager of the Exhibition, which will open to the public on Tuesday, March 25, and run through Saturday afternoon.

## Machine and Tool Progress Exhibition May Increase Defense Production by 12 Per Cent

As plans for the 1941 Machine and Tool Progress Exhibition, to be held in Detroit's Convention Hall the week of March 25, neared completion, it was estimated by men familiar with industrial equipment that the educational value of this show and the technical sessions associated with it may possibly increase the productive capacity of industrial equipment as much

as 12 per cent.

At the present time it is estimated that heavy equipment used in the defense production program are actually removing

### Wesson, Davies Among Speakers At March Meeting

General C. M. Wesson, Chief of Ordnance, U. S. Army, will be the speaker for the Preview dinner on Monday night, March 24. Toastmaster for the occasion will be L. Clayton Hill, Murray Body Corporation. An invited group of production executives will visit the exhibits of the American Society of Tool Engineer's Show, which opens the next day, and will hear General Wesson speak on the subject "What is Needed for National Defense."

Technical Sessions of the Annual Meeting of the A.S.T.E., which will be held concurrently with the Show, will concern themselves with National Defense. The first symposium, on Tuesday night, will be devoted to aircraft. Walter Wagner, Master Mechanic, Lincoln Motor Company, will preside. Papers will be presented upon "Tooling for Aircraft Fuselage Production" and "Tooling for Aircraft Engine Production." Discussion of the papers will be led by C. C. Carlson.

Naval problems will be treated at the Wednesday night symposium. Chairman will be Homer C. Bayliss. Joseph A. Davies, Chief Planner and Estimator, Naval Gun Factory, will speak upon "Planning for Production of Naval Ordnance Units." Other speakers will be announced later.

"Education for National Defense" will be the subject for the Thursday Night session, at which H. D. Hall will preside. P. W. Brown, Assistant Works Manager, Wright Aeronautical Corporation, will speak on "Industry's Need in Skilled Help." Because of the difficulty which Wright has had in manning their large plant expansions recently, Mr. Brown will be in an excellent position to cover this situation. Carl A. Gray, Chairman of the Governor's Committee in Industrial Training for the State of Connecticut, will explain "How Connecticut Solved



**Chairman Weaver**  
Secures the speakers.

metal at only about ten per cent of their capacity. The use of better planning and of prearranged templates and set-up fixtures can increase the operating time on these machines by as much as one hundred per cent. The better knowledge of the latest developments in tools and their applications to the defense program which those in attendance at the show will acquire, will enable them to more efficiently plan and tool the defense jobs which they meet in future months.

It is estimated that registration will run around 30,000 for this year's Machine & Tool Progress Exhibition. Experience has shown that each registrant, on the average, attends the Show three times in order that he may more thoroughly take in the exhibits and technical sessions. The door admissions for the Show will therefore probably exceed 80,000.

Industry's Training Problem." The work of Mr. Gray's Committee has been instrumental in giving his state a leading place in industrial training. James R. Weaver will discuss the A.S.T.E. educational program and will lead a discussion of the other papers.

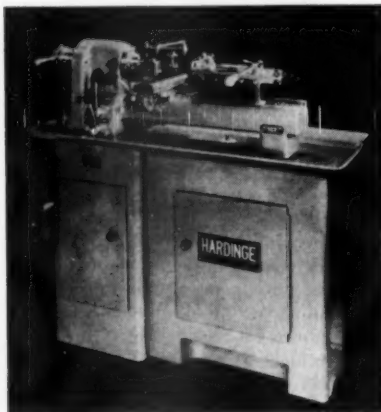
# IT'S NEW

## NEW EQUIPMENT—NEW MATERIALS—NEW PROCESSES

### **Hardinge Second Operation Machine (E1)**

A new High Speed Precision Second Operation Machine is offered by Hardinge Brothers, Inc., Elmira, N. Y. This machine is said to be a complete refinement of all their similar, previous machines. Secondary operations, in many cases, are the final finishing or exact sizing operations performed on a partially completed part.

This machine includes an enclosed head with preloaded ball bearing spindle construction, electrical driving unit with multi-speed motor, eliminating all gears, clutches, and loose pulleys, convenient lever speed control at the headstock of the machine, and welded, all steel pedestal.



**Second Operation Machine**  
*Previous machines were refined.*

The pedestal encloses completely the motor and driving unit to afford greatest safety for the operator and also to protect the driving unit from foreign matter. The motor belt is adjusted from one step to another by opening a door in the pedestal. Another door opens into cabinet storage space for attachments.

### **LeBlond Gun Rifling Machine (E2)**

A new No. 2 Gun Rifling Machine of the R. K. LeBlond Machine Tool Co., Cincinnati, is built for rifling guns up to

three inch bore, 88 inches in length. Indexing the gun or indexing the bar is said to be quite simple with this machine. The grooves may be either cut or broached. Adjustable Automatic Stops control the movement of the carriage. At the end of each stroke it stops. It is possible to get any travel up to the maximum of ten feet.

Conveniently located on the control rod are two manually operated levers. The control rod runs the full length of the bed, and operates a four-way valve to start, stop, and reverse the direction of travel on the carriage. In the head-end leg are two adjustable hydraulic speed control valves—one to change the speed of the carriage on the forward stroke, while the other performs a similar duty on the return stroke.

### **Jones & Lamson Vertical Optical Comparator (E3)**

A new Vertical Optical Comparator has been added to the line of the Jones and Lamson Machine Company, Springfield, Vt. The machine is said to be suitable for laboratory or shop use. Set in the object staging table is a  $3\frac{1}{4}$  inch diameter glass disc on which objects may be staged for projection. To focus the object, the table is adjusted vertically by a screw at the top of the machine.

An eight inch ground and lapped mirror, coated with aluminum oxide, reflects the object shadow on to a 14 inch receiving screen. The machine is designed for checking small, flat objects which can be laid directly on the glass stage. The enlarged shadow of the contour can be compared with outline on the screen. Projection lenses are available to provide

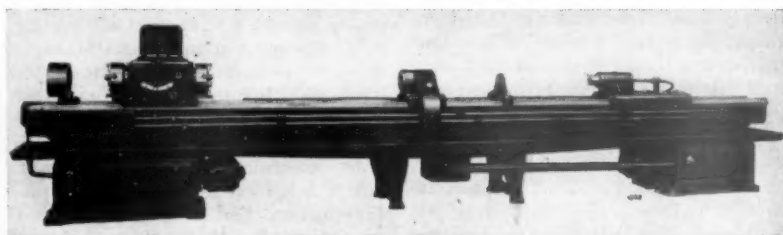


**Vertical Optical Comparator**  
*Rugged for the shop, accurate for the laboratory.*

magnifications ranging from six to 100 diameters.

*(Continued on following page)*

**PLEASE NOTE:** The purpose of this department is to call to the attention of its readers new production ideas. To aid readers in getting complete technical data on any item in which they are interested a key number is given for use on the post card bound in this issue.



**Gun Rifling Machine**  
*The controls are as convenient as a trigger.*

# BLUE CHIPS

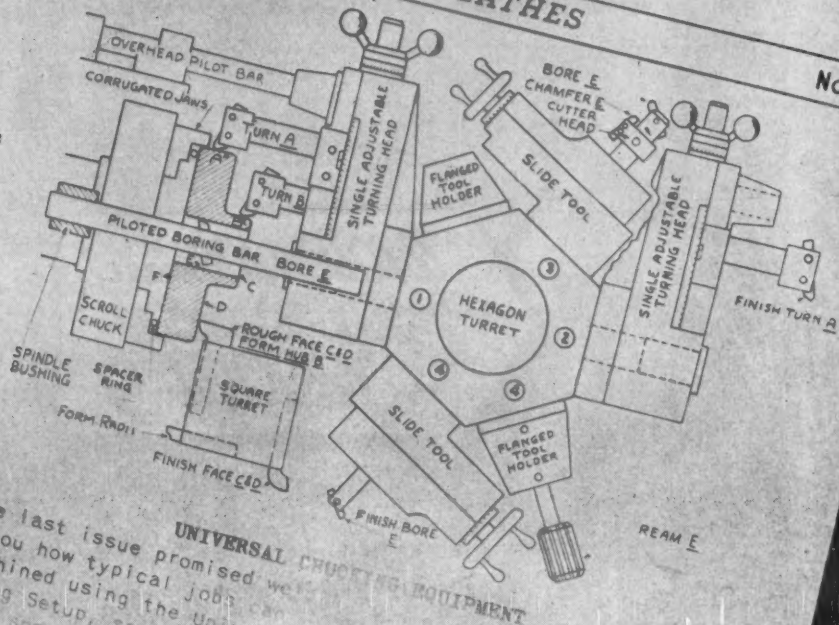
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Warner & Swasey

FOR MEN WHO KNOW TURRET LATHES

TURRET LATHE OPERATOR'S  
MANUAL

To Help You  
Get  
Better Results  
Easier

No. 5



UNIVERSAL CHUCKING EQUIPMENT

## We're Betting on Your Operators with "BLUE CHIPS"

"Blue Chips" is a bulletin sent regularly by the Service Bureau of Warner & Swasey, directly to turret lathe operators. Written in "shop language," these bulletins are full of practical ideas and suggestions to help men become better operators of turret lathes. Valuable contributions are sent in by operators all over the country. These men are finding better ways of turning metal, and want to pass along their experience. So we publish these ideas in "Blue Chips."

Today, when top production is urgent—skilled men scarce—and deliveries of new turret lathes delayed, the training of operators assumes greater importance than ever before.

Send for sample copies of "Blue Chips." Look them over and if you wish your operators to receive these bulletins regularly without cost to them or to you, send us their names and home addresses. Write

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SWASEY**  
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Operator Service Bureau 406, Cleveland, Ohio  
Gentlemen: We are interested in your offer to send "Blue Chips" to our turret lathe operators without charge and would like to see sample copies.

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YOU CAN TURN IT BETTER, FASTER, FOR  
LESS... WITH A WARNER & SWASEY



**Schauer  
High Production Speed Lathe (E4)**

A new high production speed lathe is offered by the Schauer Machine Company, Cincinnati, Ohio. Featuring continuous motor operation, this machine is intended for light finishing operations—such as burnishing, lapping, burring, or polishing of small parts—to avoid diverting heavy machinery for such operations.

Collet and spindle are magnetically controlled and are engaged or disengaged by foot-treadle operation. Special, built-in features are available to handle rods,

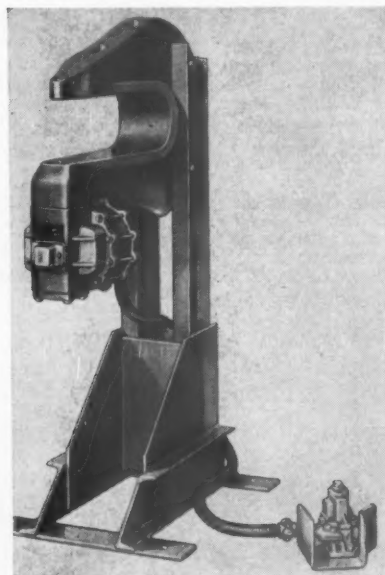


**Speed Lathe**  
Heavy machinery is not diverted.

tubes, and chuck stock or parts. This lathe is said to step-up production on the final finishing of Ball Bearing Races, Headless Set Screws, Gears, Pinions, Pulleys, Spinning Rings, Screw Machine Products of all kinds, Wire Drawing Dies, and similar small parts.

**Hanna  
Pneumatic Squeeze Riveter (E5)**

Designed especially for aircraft sub-assembly riveting is a new stationary pneumatic squeeze riveter of the pedestal type built by the Hanna Engineering Works, 1765 Elston Avenue, Chicago. This riveter is capable of exerting ten tons on the rivet at eighty pounds air pressure, and is recommended for driving quarter inch diameter aluminum alloy rivets, although it is available in a variety of sizes.



**Pneumatic Squeeze Riveter**  
For aircraft sub-assemblies.

**TAPPING SHELL FORGINGS**

*A TOUGH JOB made  
easier  
with* **Stuart's  
Thred-Kut**

use **Stuart's  
SOLVOL**  
LIQUID CUTTING COMPOUND  
*for turning!*

This new emulsifying cutting oil was developed especially for high speed turning jobs that require inspection-passing finish. It has higher cutting quality and rust preventative value than ordinary soluble cutting oils. Solvol Liquid Cutting Compound handles certain tapping and threading jobs that before needed a straight oil. Try it—you'll be pleased.

**THERE** is one sure way to simplify this and other tough jobs: Use STUART'S THRED-KUT, the cutting oil that solves the difficult cutting problems. Wide use by government armories, arsenals and by the aircraft industries recommends it! Put THRED-KUT to work for you Now! You'll save time, money and headaches.

Write . . . wire . . . phone for a trial drum. There is a Stuart engineer to help you on lubrication problems, without obligation.

**SEND FOR** the new Stuart 48 page handbook on Sulphurized cutting oils—it contains valuable information for anyone that has metal cutting problems. Please request on company letterhead.

**For All Cutting Fluid Problems**  
**D. A. STUART OIL CO.**  
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The ram is actuated by means of a pneumatically operated mechanism of the wedge and roller type. The rated pressure of the riveter is exerted thru a considerable portion of the  $1\frac{1}{2}$ " ram travel. When the ram enters the uniform pressure zone its initial rapid travel is automatically reduced, permitting the rivet to flow and fill the hole with the forming of the rivet head following automatically.

The complete mechanism is demountable, permitting modifications in the yokes or frames as the work may necessitate from time to time. The return of the piston is spring actuated, effecting economies in air consumption.

(Continued on following page)





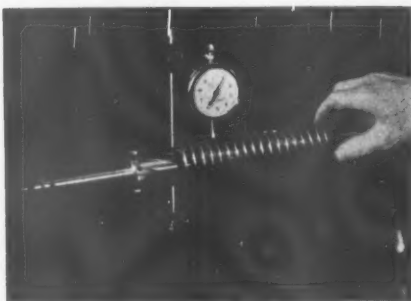
# RATED AS ESSENTIAL for DEFENSE PRODUCTION

SHOPS DOING DEFENSE WORK ARE FINDING  
THESE STARRETT TOOLS EXTREMELY HELPFUL



## ★ "AS NECESSARY AS SKILLED MEN"

is the way these Starrett Vernier Tools are rated. Leading shops find Starrett Vernier Calipers, Height Gages and Depth Gages in constant use in toolrooms, die and mould departments and for all inspection work. Complete Vernier Tool equipment is a sound, long-term investment.



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Toolmakers, machinists and inspectors are using Starrett Dial Test Indicator No. 665 more than ever. Extreme simplicity, flexibility and ease of adjustment make it the right tool for countless testing, inspecting and comparing operations. Can be used on base or in machine tool posts. Has many special attachments. Dial reads 0-25-0 in half-thousandths with a range of 3/10". Large, clear face; sharp, clean calibrations insure easy, accurate reading.



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Extra large sizes for armament and marine work, special shapes for sheet metal and aircraft operations, special features for production measuring and inspecting operations — these are the types of Starrett Micrometers finding wide use on defense work today. The more than 300 different models in the complete Starrett line makes it easy to select the one best Micrometer for any job.



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Starrett Catalog No. 26 "T" lists more than 3500 Precision Tools, Dial Indicators, Steel Tapes, Rules and Hacksaws which are available through leading supply houses. Make the Starrett Catalog your buying guide. Write for a copy.

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*World's Greatest Toolmakers*

*Precision Tools.. Dial Indicators.. Ground Flat Stock  
Hacksaws.. Metal Cutting Bandsaws.. Steel Tapes*

**ATHOL, MASSACHUSETTS, U. S. A.**

AVAILABLE THROUGH ALL LEADING SUPPLY HOUSES

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**Frantz  
Ferrofilter (E6)**

For filtering iron particles from oil a Permanent Magnet FerroFilter is offered by the S. G. Frantz Co., Inc., 161 Grand St., New York, N. Y. The FerroFilter consists essentially of a set of magnetized screens enclosed in a casing, through which the liquid flows. The screens, although offering comparatively little resistance to the flow, present hundreds or even thousands of feet of strongly magnetized edges to the materials passing through. These are said to comb and recomb the product giving an extremely high efficiency of removal of magnetic



**Ferrofilter**  
Little resistance to flow.

particles, which are retained on the screen edges until the end of the run. The FerroFilter is then demagnetized and flushed.

The filter is said to catch particles as small as one micron, while the open flow passages allow high capacity in small space, resulting in low-cost treatment.

The Ferrofilter finds its principal use in lubricating oil and cutting oil circulating systems. Iron particles in the oil have two kinds of harmful effects—mechanical and chemical. If the oil contains iron particles they give it an abrasive action which accelerates wear, and iron serves as a catalyst to accelerate oxidation of the oil.

**DoAll  
Precision Surface Grinder (E7)**

A new Precision Surface Grinder, the result of two and a half years of development work, is announced by Continental Machines, Inc., 1304 S. Washington Ave., Minneapolis. The base of the machine weighs 815 pounds and is of full box construction. Box and table are made of alloyed cast iron. Table movements both longitudinal and cross are hydraulically driven, insuring smooth operation. A built in dial indicator registering in tenths of thousandths augments hand wheel feed, enabling the operator to grind to extremely close limits.



**Surface Grinder**  
2½ years became 815 pounds.

The indicator is coupled directly between the wheel head and table, thus giving a direct reading of any movement of the grinding wheel relative to the work being ground. Table travel is infinitely variable from zero to 50 f.p.m. Cross feed is variable from zero to 150 thousandths at each reversal of table travel. A built in cold fluorescent type lamp provides a soft illumination to the table which is helpful in bringing the grinding wheel in contact with the work.

(Continued on following page)

**THE TOOL ENGINEER**

**Drive-All**  
MOTORIZING UNITS

Applied to  
**ALL SIZES,  
ALL MAKES  
of MACHINES**

Sizes up to  
**10 hp**

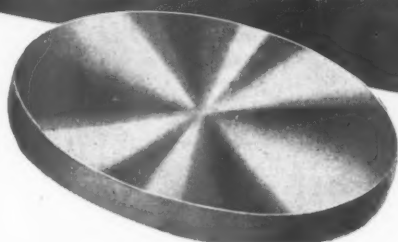
**PROMPT  
DELIVERIES**

Used by  
**U.S. GOV'T.  
AND LEADING  
MANUFACTURERS**

**Drive-All**  
MANUFACTURING CO.  
3400 Conner Ave. — Detroit, Michigan

MANUFACTURED BY

# Cuts Non-Ferrous Metals with **POLISHED** Smoothness



## New Delta Low Cost CUT-OFF MACHINE

This new Delta Cut-Off Machine is designed especially for cutting copper, brass, aluminum and other non-ferrous metals with polished smoothness. It is equipped with a special high-speed steel blade and oiling device which feeds cutting oil to the blade. It leaves the cut perfectly smooth, thus eliminating additional finishing and polishing operations. Here is a powerful, accurate machine made available at a fraction of the prices customarily charged for machines of this type. It can be used anywhere, in large shops or small, where non-ferrous metals have to be cut to accurate length on a production basis.

### Cuts These Materials

**Solid Sections:** Soft Brass up to 1½" diameter; Half-Hard Brass, up to 1¼" diameter; Aluminum, up to 1½" diameter; Aluminum Extruded Sections, up to equivalent of 2 sq. in.; Copper, up to 1½" diameter, or equivalent of 2 sq. in.; Magnesium (Dow Metal), up to 1¼" diameter; Micarta and Similar Rods, up to 1½" diameter.

**Tubular Sections:** Soft Brass, Hard Brass, Aluminum, Copper, Dow Metal, Micarta and Similar Tubing, all up to 2" diameter.

### Many Special Features

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double arbor sealed-for-life bearings requiring no lubrication—powerful Texrope V-Belt drive—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards.



No. 1631 Non-ferrous Cut-Off Machine. With blade guard, belt guard and chip guard.

Send for Special  
Cut-Off Machine  
Bulletin  
giving full details  
and prices on this  
Delta Cut-Off Ma-  
chine and all ac-  
cessories.

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Please send me special bulletin on the new Delta Cut-Off Machine for non-ferrous metals. Also send latest Delta Catalog of Industrial Power Tools.

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Firm.....  
City..... State.....

## IT'S NEW

### Skilsaw Compact Belt Sander (E8)

A lightweight  $2\frac{1}{4}$  inch belt sander called "Zephyrplane Junior" has recently been introduced by Skilsaw, Inc., Chicago. The sander has a die-cast aluminum frame for lightness and strength, ball-bearing construction, and a universal motor. Other features include a bakelite handle, a safe trigger-type momentary switch and a patented "touch-control" lever which permits quick changing of belts. The belt travels at a speed of 600 surface feet per minute, is kept uni-



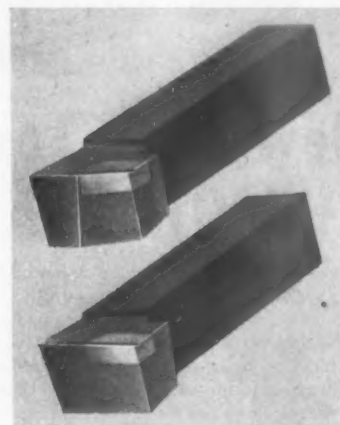
**Belt Sander**  
Produces a ripple free surface.

formly taut by a coil spring, and can be easily centered by a simple adjustment.

The sander is said to provide perfect balance so that uniform pressure is applied over the entire sanding area—helping produce a smooth, ripple-free surface, faster and more easily than by hand sanding.

### Kennametal Turret Lathe Tools (E9)

Two new styles of tools for facing operations in turret lathes have been added to the standard line of McKenna Metals Co., 600 Lloyd Ave., Latrobe, Pa. Known as Style Nos. 21 and 22, these tools have



**Lathe Tools**  
Use a negative back rake.

6° side and front clearance angles, 8° end cutting edge angles, 6° side rake and 2° negative back rake. Style 21 tool has a 20° side cutting edge angle which results in tool life and therefore this tool should be used where a 90° shoulder on the work is not required. For facing to a 90° shoulder, Style 22 tool, which has a zero side cutting edge angle, should be used.

Use of the negative back rake is said to strengthen the carbide tip.

### Western Multi Motor Mounting (E10)

A Multi Motor Mounting which provides for individual motor installation on all types of used machine tools is announced by Western Manufacturing Company, 3406 Scotten Ave., Detroit.

The mounting accommodates all NEMA frames 204 to 326, including practically all Canadian, British, South American and overseas motors, together with older and special motors up to ten H. P. used in the United States. No extra plates or rails are necessary, motor installation time is reduced to a minimum, it is claimed, and provision has been made for the take-up of V-belts between motor and transmission.

(Continued on following page)

# Hanna

## Air Hoists

### PROVED SHORT-CUTS

#### to INCREASED SPEED, GREATER FLEXIBILITY and LOWER COST!

Today's production schedules call for short-cuts all along the line—to increase efficiency and productivity of existing man power. Hanna Air Hoists will supply the answer to your problems of handling and spotting loads from machinery to transportation and from transportation to machinery. In fact, any job that needs a lift can be done quickly, safely, and at low cost with Hanna Air Hoists. The cost of operation is less than 1/1000th of a cent per foot of lift per 100 pounds!

Write for complete information today.

## HANNA ENGINEERING WORKS

1765 ELSTON AVENUE • CHICAGO, ILLINOIS  
Air & Hydraulic CYLINDERS • Air HOISTS • Air & Hydraulic RIVETERS



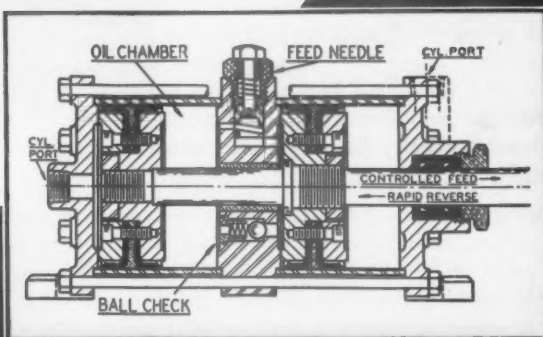
# "LOGAN" AIR-DRAULIC CYLINDERS

NEW ★ REVOLUTIONARY ★



**OPERATED BY AIR - YET ALL  
HYDRAULIC FEATURES RETAINED**

Industry has long needed a cylinder that combines the speed of an air cylinder with the smooth, steady cushioning action of a hydraulic cylinder. "LOGAN" Air-Draulic Cylinders retain all of the best features of both. They are adaptable wherever air pressure is available as a power means. The hydraulic regulating action is self-contained, providing a



smooth flowing feed stroke, either continuous or adjustable. These new "LOGAN" Air-Draulic Cylinders are ideal for the operation of machine slides, drilling heads, work holding tables or machine operations requiring controlled movements. Write today for Bulletin 470 giving complete information.

**LOGANSPORT MACHINE, INCORPORATED**

902 PAYSON ROAD,

LOGANSPORT, INDIANA

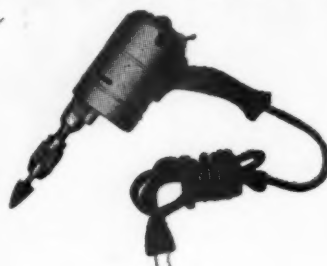
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

## IT'S NEW

### Paramount Electric Tool (E11)

A versatile electric tool is offered by Paramount Products Co., Dept. 2-10, 545 Fifth Avenue, New York City. This tool, which operates on either A.C. or D.C., is said to be adaptable for drilling, grinding, sharpening, wire-brushing, sanding, polishing, sawing, shaping, etching, engraving, and carving.

The tool itself is of small, die cast construction with a heavy duty motor and built in cooling fan. The total weight is about three and a half pounds. Various



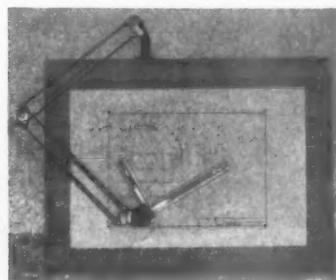
**Electric Tool**  
Total weight of 3½ pounds.

accessories may be secured for adapting the tool to different operations.

### Drafto Drafting Machine (E12)

The Drafto Company, 110 Walnut St., Cochran, Pa., announces production of a new, low-priced drafting machine, designated as the "Master-Drafto" Model No. 60, which takes a maximum size sheet 24 x 36 inches.

Light in weight for ease of operation, the Master-Drafto is solidly built to stand hard use. The arms are constructed of seamless steel tubing, fitted with solid bearings. The scale blades are designed so that any scale, either boxwood or aluminum, can be inserted. These scales will fit tightly into the blades without deviating from the necessary 90 degree angle.



**Drafting Machine**  
Accurately set to ½ degree.

An outstanding feature of this drafting machine is its protractor device. The stainless steel protractor plate is graduated in 2 degrees, and can be set accurately for ½ degree readings by use of the graduated vernier.

### Pratt & Whitney Gun Barrel Chambering Machine (E13)

The No. ½B Gun Barrel Chambering Machine offered by Pratt & Whitney, West Hartford, Conn., has been improved as machine tool practice has advanced. The machine performs the various operations in the butt end of a previously drilled, reamed, and rifled gun barrel to form the accurate chamber which receives the cartridge. The gun barrel is held at one end in the work spindle by a lever operated collet chuck. Its outer end is supported in an adjustable lathe type steady rest with spring operated jaws allowing the barrel to float to overcome eccentricity.

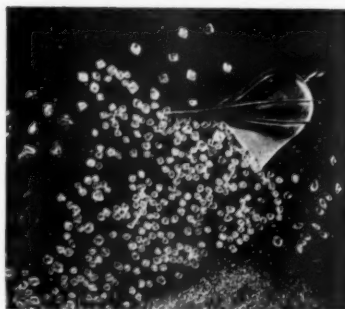
The turret of the machine contains ten tool spindles. Each is fitted with a tool adapter which includes a nut and lock nut, adjustable lengthwise, which acts as a depth stop as the tool is fed into the barrel. A special collar threaded to the end of the barrel meets these depth stops.

(Continued on page 40)

## You can go faster and farther with INDUSTRIAL DIAMONDS

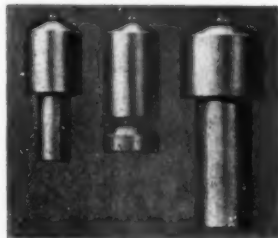


● With manufacturing activity at an all-time high and still mounting at a tremendous rate, production machinery is at a premium. Especially is this true of machine tools. Yet many manufacturers who are today handicapped by the need of additional machine tools, could substantially increase their production with the machines they already have, by using diamond cutting tools.



The growing demand during recent years for faster and more accurate cutting of new, hard materials, has widely extended the use of diamond tools for a great variety of operations in industry. Diamond-tipped boring, milling and turning tools are used for precise fast work, especially on very hard or abrasive materials such as hard steels, rubber, fibre, plastics, etc. And, of course, for wheel truing nothing else approaches the diamond.

For more than thirty years Anton Smit & Co., Inc., have contributed substantially to the industrial development of rough diamonds. They are one of the few companies that control all steps in the production of diamond tools—mining, importing, tool making and servicing. In dealing with Anton Smit & Co., Inc., you are assured complete satisfaction in the quality of the diamonds or tools you buy. Large stocks of Bortz, Ballas, Carbons, Splint, Points, Crushing Boart, Powder, etc., in all sizes and qualities on hand. Send for illustrated folder and prices.



Left to Right—Landis Nib,  
Norton Nib, Cincinnati Nib.

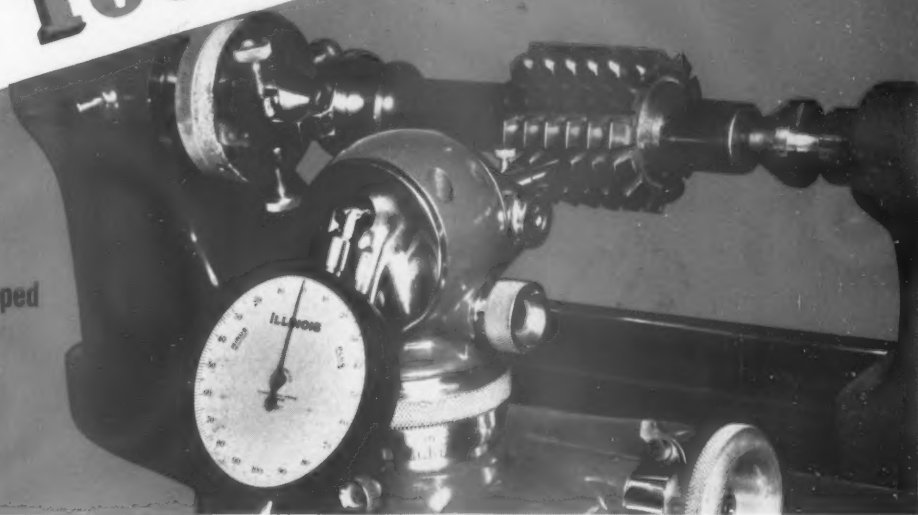
**ANTON SMIT & CO., INC.**  
24 STATE ST. (near Battery) NEW YORK, N. Y., U. S. A.

HELPING SOLVE INDUSTRY'S PRODUCTION PROBLEMS



# *Taking the guesswork* **out of TOOL INSPECTION**

Measuring machines developed  
by "Illinois Tool" engineers  
made possible the accurate  
checking of cutting tools!



Correct sharpening is the most important factor affecting the accuracy and productivity of metal cutting tools.

Hobs, shaper cutters and other tools that generate a conjugate profile on the work can be a complete failure if sharpened incorrectly. Similarly, milling cutters, formed cutters and other rotary cutting tools will deliver more accuracy and dollar value if all cut-

ting teeth do an equal share of the work.

The only way to indisputably determine whether all cutting teeth are "workers" instead of "shirkers" is to check each tool after sharpening on fundamentally sound inspection equipment. It will pay you to investigate the economic benefits of an installation of ILLINOIS Measuring Machines in your tool grinding department.

## **ILLINOIS**

**MEASURING MACHINES  
FOR CUTTING TOOLS**

*Universal Cutter and Hob  
Measuring Machine  
Hob Lead Measuring Machine  
Hob Tooth Profile  
Measuring Machine  
Universal Hob and Worm  
Measuring Machine  
Shaper Cutter Sharpening  
Inspection Fixture*

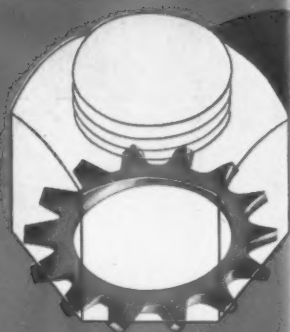
# **ILLINOIS TOOL WORKS**

**MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS**

2501 N. KEELER AVENUE, CHICAGO, ILLINOIS • IN CANADA: CANADA ILLINOIS TOOLS, LTD., TORONTO, ONTARIO

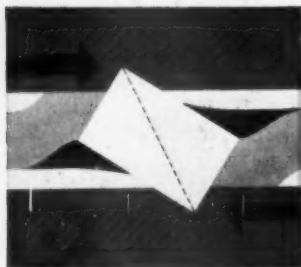
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Give your product  
the positive protection  
of *Multiple Locking!*



# SHAKEPROOF

## LOCK WASHERS



Easy to handle—can't  
tangle—won't spread!



Locks tight with only  $\frac{1}{4}$   
turn of wrench or driver.

### EACH TAPERED-TWISTED TOOTH ACTS AS A POWERFUL LOCKING STRUT!

When a nut or screw is turned down tight on a Shakeproof Lock Washer, each tapered-twisted tooth bites into both surfaces. When vibration attacks and the nut or screw attempts to loosen, it is stopped by the powerful strutting action of each tooth. As vibration increases, the teeth bite in deeper and, regardless of how severe the vibration becomes, the nut or screw stays locked tight. That is why Shakeproof Lock Washers offer you the maximum in vibration protection. That is why they are known today as "the standard of locking efficiency!"



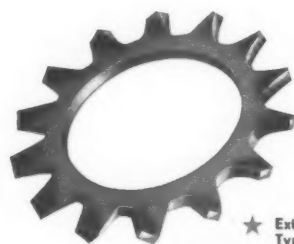
ASK FOR FREE SAMPLE RING...

Here is your opportunity to test Shakeproof Lock Washers yourself. This handy ring carries an assortment of popular sizes and types and is yours for the asking—write us today!

### SHAKEPROOF LOCK WASHER CO.

Distributor of Shakeproof Products  
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★ External  
Type



★ Internal  
Type



★ Countersunk  
Type



★ External-Internal  
Type

# SHAKEPROOF

SEMS Fastener Units... Lock Washers  
... Locking and Plain Terminals

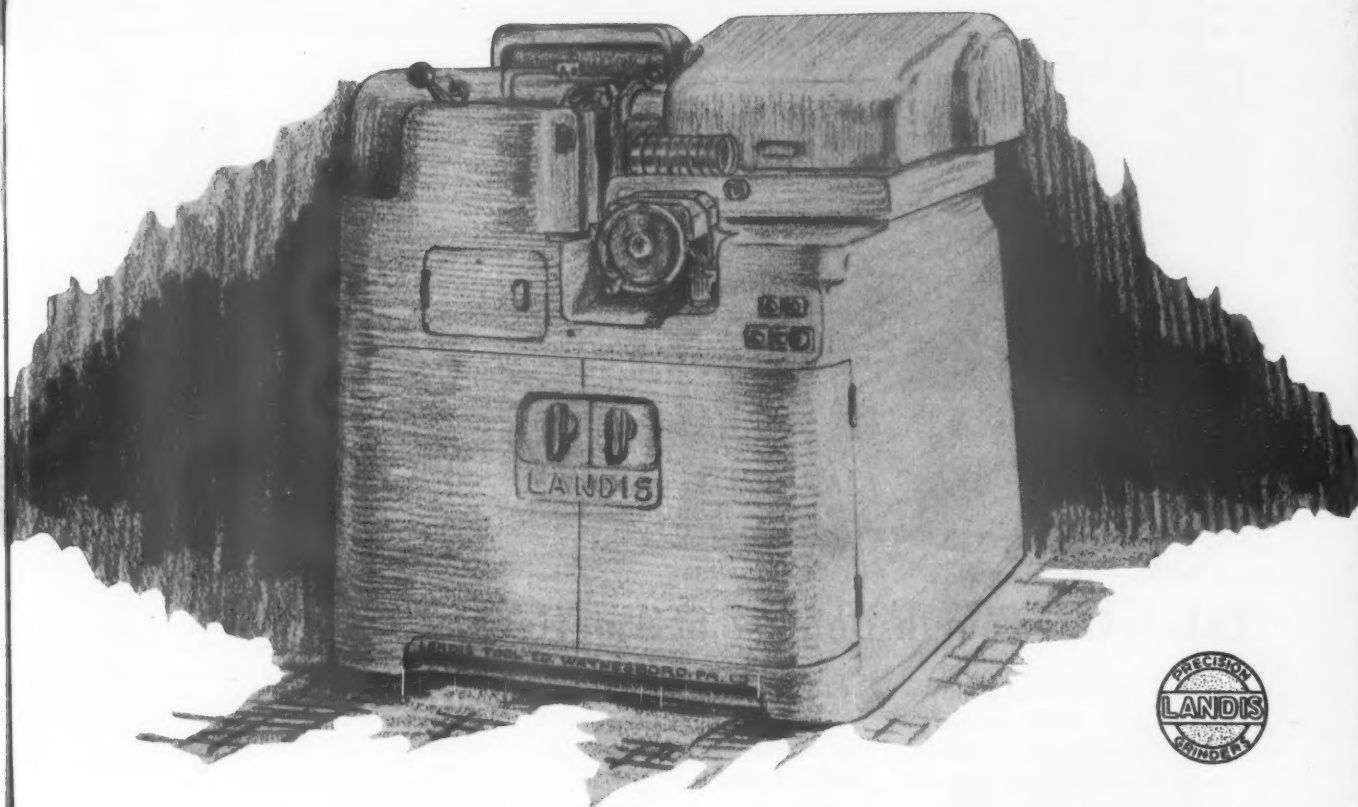
*Fastening  
Headquarters*

Thread-Cutting Screws... Locking Screws  
... Spring Washers... Special Stampings

Shakeproof Lock Washers  
are carried in stock by lead-  
ing industrial distributors!



# HOW SHALL I GRIND MY BALL RACES



## WITH THE LANDIS No. 2 RACE-A-WAY GRINDER

**Because of its range.** Tooling may be had for internal grinding the raceways of outer races or external grinding the raceways of inner races. Sizes up to and including the 409 group may be internal ground and up to the 414 group external ground. Both single and double row types may be handled.

**Because of its performance.** Automatic sizing assures the consistent holding of closer than average limits. One man may easily operate two machines.

**Because of its appearance.** Really different. Streamlined, with outside of bed devoid of levers, attachments and control boxes. Pleasing to look at—safe—easy to keep clean.

A closing thought for ball bearing manufacturers. Want to keep your costs up? Then, continue **not** to use the Landis No. 2 RACE-A-WAY.

No. 358

# LANDIS

WAYNESBORO

*Tool Company*

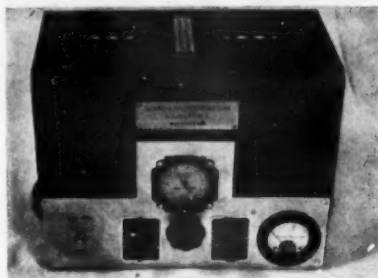
PENNSYLVANIA

## IT'S NEW

### Commonwealth Soren Varitime (E14)

A new instrument known as the Soren Varitime has been announced by the Commonwealth Engineering Company of Ohio, Dayton. This device can be used to vary the speed of synchronous motors, and also to test such motors as to their speed.

The Soren Varitime supplies a voltage of a controllable variable frequency and to also supply power to operate electrical devices. It provides an adjustable frequency range of from 18 to 240 cycles. It is housed in a sturdy steel cabinet, the

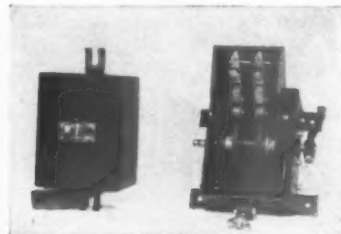


**Soren Varitime**  
Supplies a controllable frequency.

30 watt model weighing about 20 pounds. It is capable of adjusting the speed of synchronous electric motors over a five to one range.

### Westinghouse Cam Limit Switch (E15)

A new cam-operated limit switch with contacts arranged to swing open for easy inspection and maintenance, and designed especially for control circuits of such devices as hoists and industrial trucks, is announced by the Westinghouse



**Limit Switch**  
Micarta fingerboard contacts.

Electric & Manufacturing Company, Dept. 7-N-20, E. Pittsburgh, Pennsylvania.

Special feature of the new switch is the Micarta fingerboard on which the contacts are mounted; it swings upward out of the case for easy connecting, inspection and maintenance.

Operation is by means of a cam-shaft on which rollers travel. These rollers make or break the contacts at any point on the travel. The switch may be actuated either by a revolving shaft coupled to its cam shaft, or by the movement of an operating lever attached to the cam shaft. The moving contacts are self-aligning, with a compensating type operating finger.

### Key Numbers are for Your Convenience

Use them on Postcard in this issue.

### New Process For Extruding Plastics (E16)

In keeping with the rapid developments made by the use of plastics in the industrial fields, the Detroit Macoid Corporation announces the perfection of a new process for extruding plastics.

The company states that by this new method it is possible for them to manufacture individually designed moldings, strips, tubing, rods, etc., in continuous lengths. Prior to this new development the length of a plastic strip was limited. Die costs for individually designed pieces are said to be extremely nominal. Other advantages claimed for this new plastic process are economy, smooth lustrous finish, low heat conductivity and imperviousness to changing climatic conditions.



## This is Our Fourth Defense of America

● These particular Tool Steels were born in 1854. They've had plenty of experience in production for defense—in the crucial periods of 1861, 1898, 1917—and now again, in the 1940's.

We know there is no virtue in traditions, except as they carry extra value for you. And A-L Tool Steels do! For every type of machine work in your shop, they bring you qualities

of high productive capacity and extremely uniform performance—qualities that let you plan and maintain top-speed schedules.

Back of these fine steels, there are distributive facilities in every national area, and a Mill Service organization ready with the answers to your problems. ● You'll find "A-L" the right Tool Steels for your jobs.

ALLEGHENY LUDLUM STEEL CORPORATION • GENERAL OFFICES: PITTSBURGH, PA

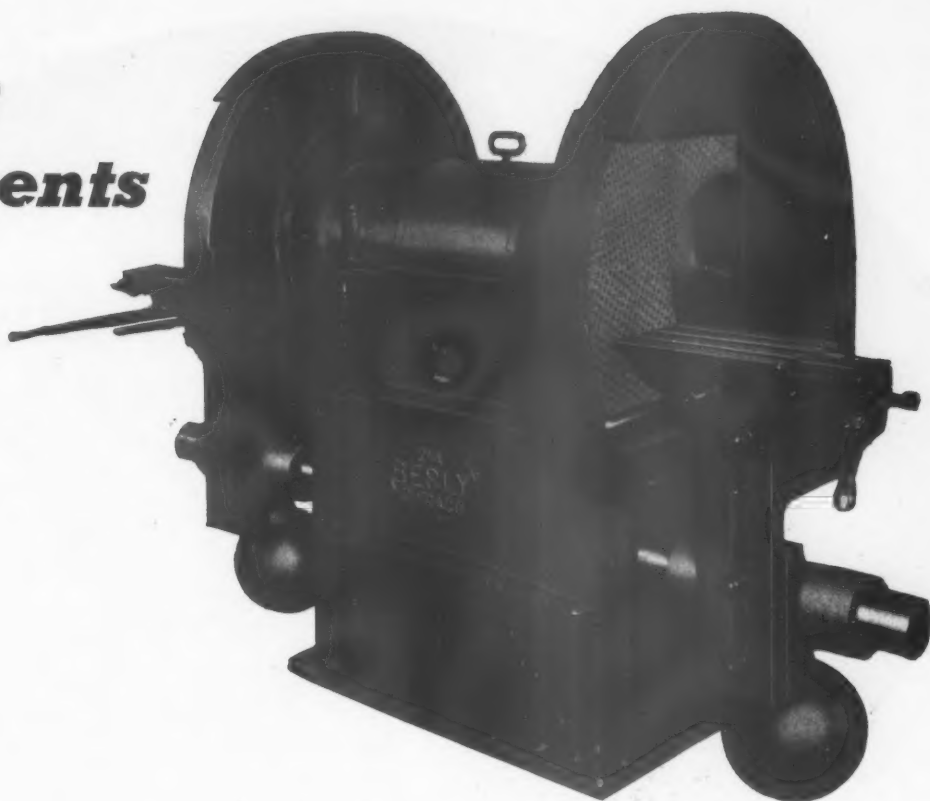


Write for a copy of our new "Handbook of Special Steels." Send the coupon to Allegheny Ludlum Steel Corporation, Tool Steel Division, Watervliet, New York.



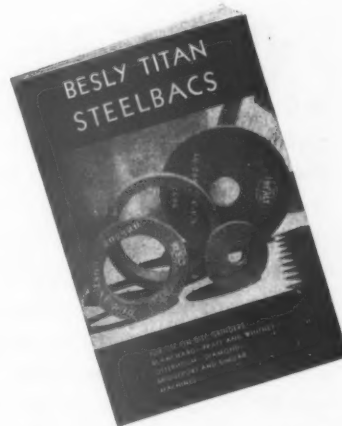
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# Besly *Presents*



**The Disc Grinder** with real production possibilities. This massive rugged Besly Grinder turns out work at an amazing rate. Equipped with Besly Titan (Bolted-On) Steelbac Abrasive Discs, forty inch diameter, two or three inch thick. Served by Geared Lever Feed Tables with 20 to 1 ratio. Can you visualize its capabilities? The Wheel Collars are twenty-two inch diameter—Rockershaft carrying the Tables four and one half inch—Spindle almost four inch where it is mounted on highest grade Ball Bearings. It will effect wonderful economies and increase production in your plant. Its 25 H.P. Totally Enclosed Fan Cooled Ball Bearing Motor transmits power to spindle through eight Vee Belts. Heavy Welded Steel Hoods protect the operator. Built also in smaller sizes with Abrasive Discs down to 18 inch diameter. All these Besly Grinders remove stock with astonishing speed and the improved grinding members (Besly Titan Steelbac Abrasive Discs) effect marked savings in abrasive costs.

Get further details on what the modern Besly Grinder will do for you.



*[ Write for your copy of Booklet  
on Besly Titan Steelbacs. ]*

## CHARLES H. BESLY AND COMPANY

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CHICAGO, ILLINOIS

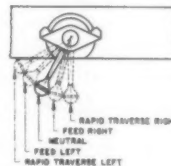


## *W*inding path taken by finished surface JUST AS EASY TO FOLLOW AS A STRAIGHT CUT

Milling operations on surfaces that follow a winding path, or veer off at right angles and then double back, are just as easy for the operator of a CINCINNATI Vertical Hydro-Tel as a straight-away conventional milling cut. Notice the job illustrated above. With two hands on the operating controls, and exerting only about one pound pressure with each (hydraulic servo control does the actual work), the operator guides the part under the cutter just as surely and evenly as a tailor cutting suit material. Consider the table

control lever, for example. *With this one lever, he controls five table functions.*

Other controls are just as convenient and easy to manipulate, fairly inviting the operator to turn out more work. Catalog M-865 gives you the complete story of the accuracy, productivity, and easy control of CINCINNATI 28" Series Vertical Hydro-Tel. Write for your copy today.



## THE CINCINNATI MILLING MACHINE CO.

CINCINNATI, OHIO, U. S. A.

MILLING MACHINES . . . GRINDING MACHINES . . . BROACHING MACHINES . . . DIE SINKING MACHINES . . . CUTTER SHARPENING MACHINES



# Production Perspectives

## News of Mass Manufacturing Everywhere

**T**HE new defense high command at Washington set as its goal maximum production "in every field which can contribute to victory" and asked for cooperation of "every element in the American community." The expression of purpose was made by William S. Knudsen, director of the office for production management for national defense, in a statement at the close of a day which saw these concrete steps in the rearmament program: Extension of the export control system to 15 additional items, including chemicals useful in production of war gases and aviation gasoline. Placing of navy orders totaling \$284,218,700 for 60 submarine chasers and auxiliary vessels. Included were four ships designed for placing anti-submarine nets at entrances to strategic harbors. Selection of a site at Tulsa, Oklahoma, for a plant which will assemble planes from parts made in automobile factories. Similar plants already have been allocated to Omaha, Neb., and Kansas City, Mo. A fourth is to be built also in the west, giving the group a capacity of 3,600 bombers a year. Award of a \$6,756,399 contract to the Hercules Powder Co. of Wilmington, Del., for operation and equipment of a powder bag loading plant near Pulaski, Va. This plant will operate in connection with the \$36,000,000 powder plant the same firm is building for the government at Radford, Va. Knudsen asked the American people to recognize "the full gravity of the crisis" in the world and "figuratively to pull off their coats and roll up their sleeves and give their concentrated, undivided attention to one thing—the swiftest possible production of means of defense." He said "the contest which produced this crisis is irreconcilable in character and cannot be terminated by any methods of appeasement."

**T**HE New England Council has issued appeals for "more expansion, more speed" by Industry of the six Northeastern States in filling defense orders totaling \$1,500,000,000.

Council President Ralph E. Flanders called upon the area's business and industrial leaders to act immediately on the plea of William S. Knudsen, national director of production.

Flanders, who is president of the Jones & Lamson Machine Works, Springfield, Vt., said some large companies had been found laggard and some small plants did not show the proper initiative in seeking sub-contracts though "public opinion in New England is overwhelmingly for a defense which includes all possible aid to Britain short of the use of our armed forces."

In industries, such as aircraft, shipbuilding and machine tools, Flanders said, the problems of private business must be forgotten and expansion must proceed rapidly with no limits except "those set by effective production."

Failure of government officials to determine requirements and furnish an orderly delivery schedule was blamed for the lag in machine tool production by Clayton R. Burt, chairman of the National Defense Committee of the National Machine Tool Builders' Association.

In a statement, Burt, who is president of the Niles-Bement-Pond Company, Hartford, Conn., makers of precision tools, praised the outspoken criticism by William S. Knudsen of the national defense efforts.

Commenting on William S. Knudsen's plea for greater defense production, Roe S. Clark, vice president of the National

Metal Trades Association, suggests that the National Defense Advisory Commission urge all U. S. industry, large and small, to appeal to employees for speed-up suggestions.

Using as a basis the "Suggestion Box" experience of the Package Machinery Company, Springfield, Mass., of which he is a director and executive, Mr. Clark stated that of thirty production suggestions submitted by employees during the past three months, no less than six were found to be of practical value and were now in use.

He estimated that if every industrial concern in the country employing 50 or more men would use a similar method, a total of 7,000,000 suggestions would be received a year, of which more than a million would probably prove practical.

Mr. Clark pointed out that employee inventions and suggestions played an important part in the last war. They would be of tremendous help today in overcoming the production lag, saving thousands of man-hours weekly, he said. In addition, he asserted, this system has the advantage of further stimulating individual effort.

"If everyone of industry's eleven million workers can be made to realize the seriousness of the present crisis, and if every one, no matter what his position, is willing to do just

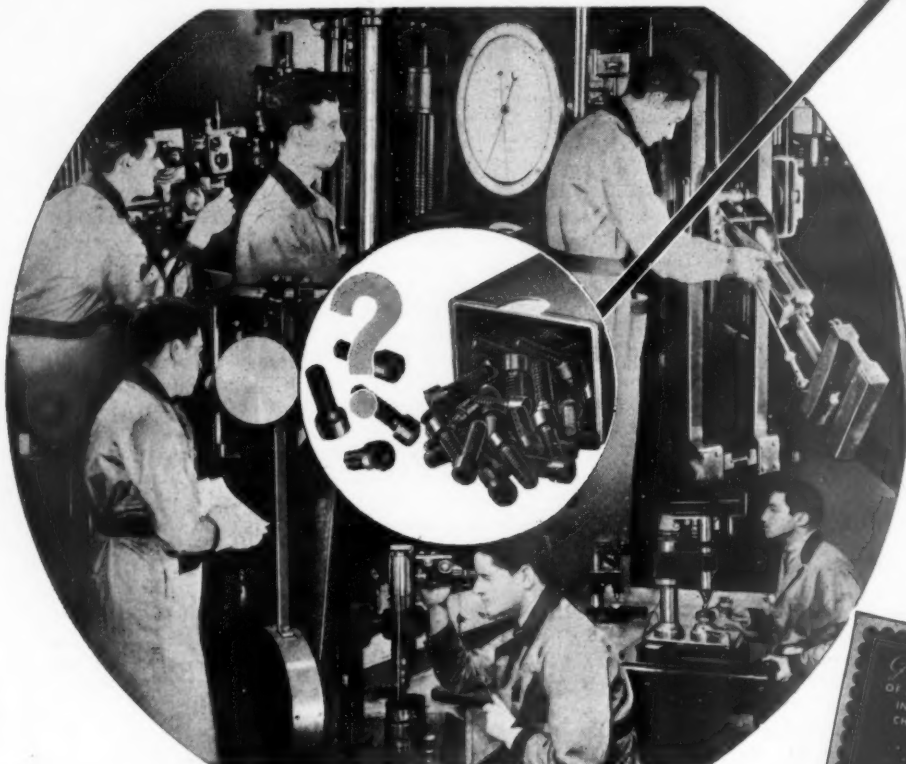
*(Continued on following page)*

## All Out For Defense



*"He claims the administration sent him to help speed up production."*

# WE'LL KEEP THE "Doubtful Few" OFF YOUR ASSEMBLY BILLS



## Parker-Kalon's Unequalled Quality-Control Laboratory eliminates the extra costs built up by "doubtful" screws

Fastening devices cost little . . . when they work right. When they don't, they cost plenty! The "Doubtful Few" . . . the imperfect units in a lot that won't drive properly, or fail in service . . . carry with them a high bill for extra time and labor, interrupted work and customer dissatisfaction.

To protect you against the cost-boosting "Doubtful Few", the Parker-Kalon Quality-Control Laboratory

was established. Without counterpart in the industry, it makes it possible to hold Parker-Kalon Hardened Self-tapping Screws, Socket Screws and other fastening devices to higher standards than ever before could be attained!

Specify PARKER-KALON for fastening devices that ALWAYS WORK RIGHT AND HOLD TIGHT. Send for folder and free samples. Parker-Kalon Corp., 190-198 Varick Street, New York.

**SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS**

*Quality-Controlled* **PARKER-KALON**  
**Fastening Devices**



**COSTS NO MORE** to get  
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Guarantee with every box of . . .



**Hardened Self-tapping Screws**  
Types, sizes, head-styles for every  
assembly of metal or plastics

**Cold-forged Socket Screws**  
Cap Screws, Set Screws,  
Stripper Bolts made to  
a new high standard  
of quality



**Wing Nuts-Cap Nuts-Thumb Screws**  
Cold-forged . . . Neater, Stronger

## PRODUCTION PERSPECTIVES

(Continued from preceding page)

a little bit more, then these production bottlenecks will be broken," Mr. Clark concluded.

**S**HORTAGE of skilled mechanics is facing Indian Motorcycle Company, Springfield, with hundreds of thousands of dollars worth of orders on hand, Dwight L. Moody, general manager said. With a \$500,000 order from the United States Army and large orders from several other governments, the plant will be as busy the first part of 1941 as it was with the large French order last year, Mr. Moody said. About 200 men will be added to the payroll, increasing employment to 750 men. Orders on hand are expected to keep the plant busy through May.

Equipment of the latest addition to the Pratt and Whitney Aircraft Corp. plant in East Hartford, Conn., is being started with 10,000 more hands to be added to the concern's payroll during the present year. The corporation now has about 20,000 workers. Plant officials already are looking forward to the weekly payroll passing the \$1,000,000 mark. The corporation now is the largest single employer of labor in Connecticut and is believed to pay the highest average annual wages in that state. Reports are that deliveries of engines now are at a rate close to 1,000 a month and efforts constantly are being made to speed up that production. The new addition will use a conveyor belt system for distribution of materials and other requirements. The aircraft corporation is said to have reached its present output three months ahead of schedule and it has been able to make promised deliveries on the minute.

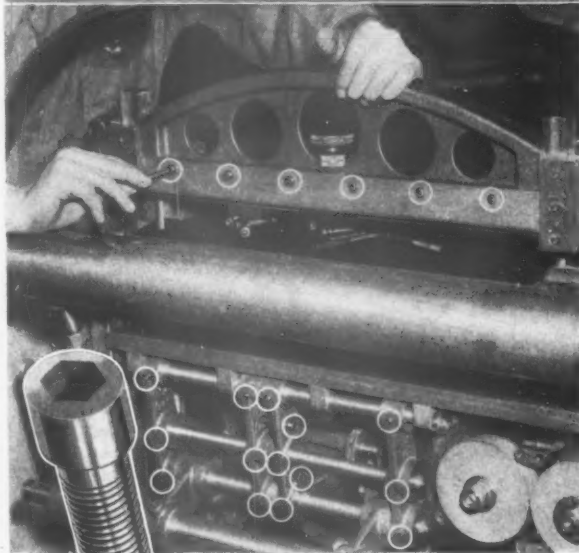
The Jones & Lamson machine shop in Springfield, Vt., has gone on a seven-day, seven-night schedule to keep up with defense orders.

**T**HE National Machine Tool Builders Association reported that the industry's capacity, based on pay roll hours, has risen 61.2 per cent since start of the European war. Machine tool index, also figured on pay roll hours, established another all-time high in December. December operations were calculated at 96.8 per cent, while capacity itself climbed 4 per cent above November. October operating activity, as in December stood at 96.8 per cent, but capacity increased 7 per cent by December. Thus, the association explained, December operations actually were far above October and all-time records are being established monthly.

K. T. Keller, president of Chrysler Corp., said at Detroit that his company, the Glenn L. Martin Co., and officials of the National Defense Commission had reached a tentative agreement under which Chrysler would produce parts and subassemblies for the Martin B-26 medium bomber. Through the cooperative efforts of the two companies, it is hoped to produce the planes at the rate of 100 a month in a new assembly plant to be built at Omaha, Neb. Announcing a new order for 10,419 specially designed trucks for the United States Army, Chrysler disclosed earlier that army orders received by the corporation in its United States and Canadian plants during the last 12 months totaled more than 57,000 units. Their value was placed at more than \$58,000,000.

Fort Worth, Texas, was selected as the site of a fourth bomber assembly plant. Under arrangements which were well advanced before a new proposal to build "500 warplanes a day" was put forward with the support of the C.I.O., the Fort Worth plant and others assigned to Tulsa, Omaha and Kansas City will turn out 300 long-range bombers monthly from parts largely fabricated in motor car factories. The Tulsa and Fort Worth plants will be built by army engineers. Each is expected to cost up to \$10,000,000.

# "There COULDN'T BE a bad P-K Socket Screw!"



## -Says Machine Builder After Visiting Parker-Kalon Quality-Control Laboratory

"My inspection trip through your quality-control department amazed me, and certainly settled the question of which socket head cap and set screws we could trust to stand the heavy torsion and other strains in our automatic spiral inserting machine," states an executive of the Spiral Binding Co. "After seeing those tests, I felt that there couldn't be a bad P-K screw . . . and in two years we have never had one fail in service or give trouble in assembly."

No less than sixteen exacting tests in the unique Parker-Kalon Quality-Control routine prevent the troubles a few "doubtful"—imperfect—screws in a lot can cause. Wise design and production men are getting the benefit of this extra protection on all fastening jobs by specifying PARKER-KALON exclusively.

WRITE today for folder describing the great Parker-Kalon Laboratory which makes it possible to maintain a new high standard in socket screws without increasing the cost. Free samples furnished on request. Parker-Kalon Corp., 190-198 Varick St., New York.



## Quality-Controlled

16-point test and inspection routine covers: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and concentricity; Class 3 Fit Threads; Clean-starting Threads.



# PARKER-KALON

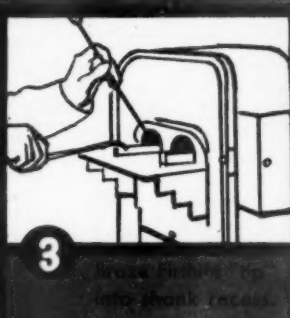
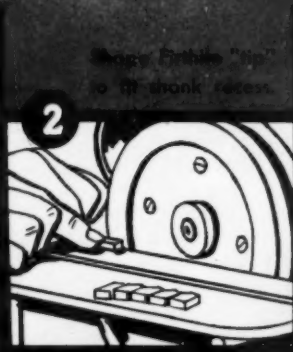
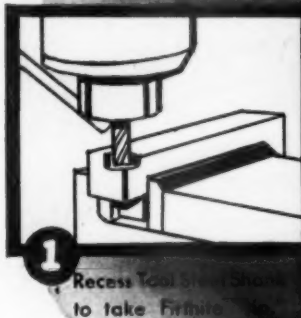
COLD-FORGED

## Socket Screws



# Make your own FIRTHITE TOOLS

## IN 4 EASY OPERATIONS!



For tool rooms or plants not equipped with apparatus for brazing single point tools, Firth-Sterling offers 2 models of BRAZE-RITE Furnaces specially designed for this work. Information about this equipment, as well as equipment for brazing multi-tipped tools, is available upon request.

Sintered Carbide Cutting Tools are *essential* to the *faster removal of metal* in Defense machining jobs. The unprecedented demand for these tools increases daily . . . and *must not* be permitted to cause "bottlenecks."

No shortage of Sintered Carbide is anticipated. But to avoid possible delays in tool *making*, Firth-Sterling offers the *plan*, the *information*, and the *materials* with which Carbide Tool users may relieve existing or threatened small tool bottlenecks . . . right in their own shops!

Write for complete information about this simple, practical plan.

# FIRTH-STERLING

## STEEL COMPANY

OFFICE AND WORKS:  
McKEESPORT, PA.  
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LOS ANGELES DAYTON  
CLEVELAND DETROIT



***Now is the Time to Look for and Guard Against***

# **SABOTAGE ★**



**Focal point of efforts to prevent rampant destruction by saboteurs is John Edgar Hoover of the Federal Bureau of Investigation. Upon his buoyant shoulders rests the task of coordinating the far flung activities of the Bureau, of enlisting proper civilian cooperation, and of preventing the growth of that hysteria which the enemies of democracy foster.**



**By ROY T. BRAMSON**  
*In Cooperation with the  
Federal Bureau of Investigation*



# SABOTAGE

**Every Tool Engineer is in a position to be of particular help in curbing efforts at sabotage. Here's how.**

**T**OOL ENGINEERS should not regard this country as neutral—or, even at peace. The United States has not entered the war—probably will not—but these are emergency times in which every effort will be made by this country to produce war supplies of every description from ships to planes and from guns to all manner of munitions. It is now apparent that our present effort is to make sure that we are prepared for any emergency which might arise should England fall. President Roosevelt disregards the idea that the war abroad will end with the conquest of Britain. This means a positive and concerted effort in arming and probably involves every plant employing Tool Engineers.

In the early part of last September the Chief Executive realizing that investigation pertaining to sabotage, espionage, neutrality violation and related matters must be conducted in a comprehensive and effective manner on a national scale, called upon all law enforcement agencies to cooperate with the Federal Bureau of Investigation. At that time he stated "To this end I request all police officers, sheriffs and all law enforcement officers of the United States to promptly turn over to the nearest representative of the Federal Bureau of Investigation any information obtained by them relating to espionage, counter-espionage, sabotage, subversive activities and violations of the neutrality laws."

That there are saboteurs amongst us is indicated by the increase in investigative work pertaining to national defense. In the five year period preceding 1938 the FBI investigated an average of thirty-five espionage matters each year. In the year 1938, 350 such cases were handled by the Bureau, while in the year 1939 a total of 1651 such matters were received for investigative attention. With the outbreak of the war in Europe this type of work increased materially and on one day in May last year a total of 2871 complaints were received. To cope with this heavy demand on the services of the Federal Bureau of Investigation, new field offices have been opened in strategic cities and a large increase in Special Agent personnel has been made.

## **FBI Plant Surveys**

At the request of the Army and Navy Departments, the FBI is engaged in a plant survey program which was undertaken in the fall of 1939. It was deemed advisable to formulate a program whereby the FBI would undertake inspection of protective facilities of a number of American basic industries whose products were considered to be essential to the operations of the Army and Navy Departments. The war and Navy Intelligence Divisions furnished to the Federal Bureau of Investigation a list of many hundreds of key industrial facilities. Included on this list were only those plants currently engaged in the manufacture of supplies of an urgent nature for the War and Navy Departments. Additional industrial units are being added constantly to this original list. Agents of the FBI assigned to this type of investigation were

sent to Washington and placed in a special training school operated in connection with this project. The curriculum of this school included technical subjects of particular interest and cases involving sabotage, chemistry, explosives, document examination, bacteriology and codes, as well as many other pertinent subjects were taught by experts of the FBI Technical Laboratory.

After the plants are carefully surveyed, reports are submitted to Washington where they are reviewed by experts on fire hazards, structural security and other factors contributing to adequate protection. Immediately thereafter Director J. Edgar Hoover submits a comprehensive list of recommendations to the appropriate executive of the industrial plant, with recommendations based on the survey report. The cooperation of the various executives of the industrial plants which have been surveyed has been outstanding. Their willingness to put into effect the FBI recommendations has far exceeded expectations. Once the defects are pointed out, they have been glad to go to considerable expense to make appropriate changes. A very important phase of the FBI's program to detect the army of spies and saboteurs concerns the indexing of all leaders of subversive groups, together with their associates, as well as all known information concerning these individuals. A constant surveillance of all known or suspected foreign agents of the United States is also maintained. Industrial accidents in plants in the priority category are being given special attention. All suspected incidents of sabotage or espionage, no matter how relatively unimportant they may appear, are investigated thoroughly.

## **Instances of Sabotage**

Several instances can be cited which indicate the need for the survey program such as is being currently carried out by the Federal Bureau of Investigation. One particular plant manufacturing a secret war material had a standing order that those in charge of engineering were to guard blue prints and other important data with the utmost of care. The order was followed to the letter and each night the confidential plans were locked in a burglar-proof concrete vault. When the FBI special agent conducting a survey looked over the vault he found it to be impregnable except for the fact that a window of ordinary glass had been built into the rear wall of the vault. This window overlooked a small landing leading to the yard of the plant, and it would have been a very simple matter for an espionage agent to have entered the vault and removed the whole collection of confidential plans. When called to the attention of plant officials this condition was, of course, remedied immediately.

In an airplane plant a special agent of the FBI entered the factory after removing all identifications and moved through the plant without being challenged. He walked behind machine tools, work benches, into experimental rooms and drafting rooms without being questioned by anyone. It is apparent,

of course, that an espionage agent might be equally free to do the same. In another airplane factory no extensive precautions had been taken to protect a secret model which was being tried out in an experimental hangar before being delivered to the armed forces. One precaution which had been taken consisted of a partition at one end of the hangar, and a special agent conducting the survey in that plant found a large hole in this partition. When asked why the hole had been made and why it was not repaired, the engineer remarked that some of the employees had kicked the hole in the partition so that they could see the new experimental plane. The official of this plant was shocked at his own lack of foresight when it was explained that the hole might have been used just as well by a spy gaining technical information for transmittal to a foreign government.

### **Rumors of Organized Sabotage**

The Federal Bureau of Investigation reports that regardless of rumors which have been circulated, there have been no *organized* acts of sabotage in the United States since the war began in Europe in 1939. The Bureau points out, however, that there is a very real menace of the saboteur and the spy and that this country should not allow itself to be lulled into a sense of false security. At the same time every effort should be made to keep our feet on the ground and not to jump at conclusions. On the other hand it is pointed out by the Bureau that many cases of actual sabotage have occurred, but these have been the efforts of individuals. At times disgruntled employees or those with a personal motive for the destruction of certain objects have caused damage. The sabotage attempts have not been the technically perfect efforts of organized groups or foreign agents.

**Preparing Specimen for Spectrographic Analysis**  
Seventy-two were reduced to eight.

Every saboteur leaves some clue. The FBI agents are expertly trained to find such clues and while the saboteur may elude capture for awhile it is almost inevitable that he will be caught sooner rather than later. The technical laboratory of the FBI forms an important cog in the machinery to fight the saboteur. Inspectors at an airplane factory recently discovered that a portion of the aluminum structure of the plane had been cut, as an act of sabotage which would have caused the destruction of the ship and perhaps the death of its pilot—if it had not been discovered. The FBI was notified and there were no clues pointing to the identity of the saboteur. A good many workmen had had access to the plane and it seemed to be a hopeless job. The FBI special agent investigating the case inspected the damaged airplane part then asked that all of the hacksaw blades in the factory be turned over to him. There were seventy-two in all, and these were shipped to the technical laboratory for appropriate spectrographic analysis. The spectrograph, which is so sensitive to color that it can pick out the position in the spectrum of the minutest particles, eliminated sixty-four of the blades and narrowed the investigation to the point where the owners or users of only eight blades could be listed as suspects. These particular blades were found to have aluminum particles on the cutting edge, thus making it likely that one of them had been used in the attempted sabotage of the airplane.

All manufacturers of essential material for national defense are urged by the FBI to cooperate by correcting all vulnerable points in their plants. In view of the fact that each industrial facility presents a different problem, it is impossible for the Federal Bureau of Investigation to make uniform recommendations for the protection of all plants. To assist those manufacturing establishments, however, which are not yet included on its survey list, the FBI has issued a confidential booklet entitled "Suggestions for Protection of



Industrial Facilities." This may be obtained by executives of such companies by communicating with Director Hoover in Washington, D. C., but receipts must be returned for copies which remain the property of the Government.

According to Director Hoover of the FBI, the saboteur employs as many methods as there are means of disabling industry, crippling power lines, and delaying the country's national defense preparations. Vital machinery may be damaged or destroyed by abrasives, chemicals, or explosives of various types. Raw materials as well as finished products may be the objects of the saboteur's efforts. Other possible acts may concern the theft or destruction of blueprints and other confidential data or injury to precision tools. Personnel injuries and attempts to pollute water and foodstuffs to be consumed by employees should be given consideration. Arson is a favorite weapon, and protection against this danger suggested by the FBI has included steps to eliminate undue negligence and existing fire hazards.

Likewise, the FBI has pointed out that espionage agents use a variety of schemes to obtain valuable information on our production facilities. Unable to attain their ends by purchase or theft, they may resort to more brazen methods such as interviews with employees.

Prior to the compilation of the confidential booklet on plant protection and the inception of any plant surveys, the FBI sent some of its selected officials into various sections of the country to make a detailed study of protective facilities and policies existing in representative industrial institutions. Based upon this survey and its wide experience in the field the FBI has been recommending that to protect against the spy and the saboteur particular attention be given by plant management to personnel and physical properties with special emphasis upon the handling of plans and blueprints and the care to be exercised in case bombs or explosives are encountered.

It is obvious that disloyal employees are in a better position to commit sabotage than an outsider, while the loyal employee can be of inestimable aid in protecting the plant properties. The FBI has pointed out that plant managers, accordingly, should consider personnel as the most important factor in plant protection. Recommendations and suggestions made by the FBI have covered such things as the establishment of a complete set of rules to be followed by employees and the full circulation and posting of such rules. It has also been recommended that by means of posters, plant publications and employees' meetings, the urgency of the current situation and the necessity of uninterrupted production can be emphasized so that there will be no diminution in employees' morale because of the most stringent plant regulations.

The FBI has emphasized the importance from the standpoint of plant protection of physical properties such as side-

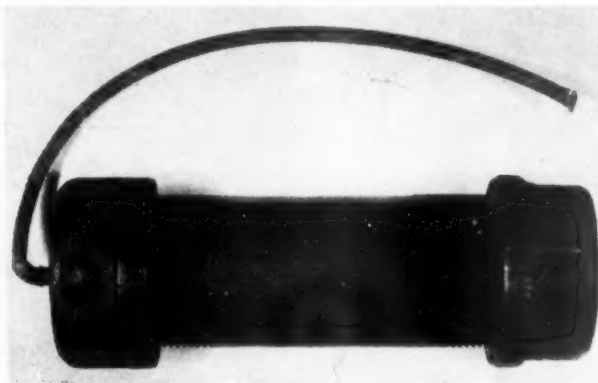
walk elevators, outside fire escapes, railroad right of ways, and unfenced areas. In fact, adequate fencing, screening, and illumination are called the three most important factors in the prevention of unauthorized entry into plants. FBI recommendations frequently concern "restricted" areas which should be closed to all employees except those regularly employed in such sections. The care of technical and precision tools is stressed.

#### Use of Plan Room

According to Director Hoover, it is important that industrial plants working on confidential material have a plan office where all items such as blueprints and working models should be maintained in fireproof containers equipped with suitable locks. Important documents should be serialized, and it is suggested that plants maintain a rigid charge-out system which would reveal the location of documents at all times. The FBI advises that a thoroughly reliable employee who has been carefully investigated should be in direct charge of the plan office. It is further suggested that no confidential material should be retained in the possession of an employee after the shift on which he is employed is completed.

In view of the fact that bombs or infernal machines may be found in industrial plants, it has been suggested that each plant have readily available the names, addresses and telephone numbers of nearby explosive experts. Untold ingenuity is employed in the manufacture of infernal machines and the FBI cautions that experience has shown there is no safe method of handling all types of such mechanisms. As an indication of the danger in handling explosives found at plants, it might be pointed out that some will explode when moved, that others will explode at a specified time by means of a clockwork device and that still others are equipped with an acid timing device which will cause the bomb to explode if it is submerged in water. Of course, the protection of human life should be the primary consideration when a bomb is discovered.

Mr. Hoover points out that while guarding against sabotage and espionage, it is essential that we take a common-sense attitude toward the problems of sabotage and avoid all unwarranted excitement. Wild scares hamper industry and law enforcement in numerous ways. While the FBI desires the cooperation of all patriotic citizens, it does not want vigilantes. Every Tom, Dick and Harry should not be branded as a spy, nor should every person with a foreign accent be called a Nazi or a Communist. Individual citizens should not try to become amateur sleuths if they are interested in making America secure from the so-called fifth-columnist. Every citizen can do his part if he will leave the work of protecting the country in the hands of organized law enforcement and will report to the nearest FBI office any information coming to his attention indicating a possible violation of our National Defense Statutes.

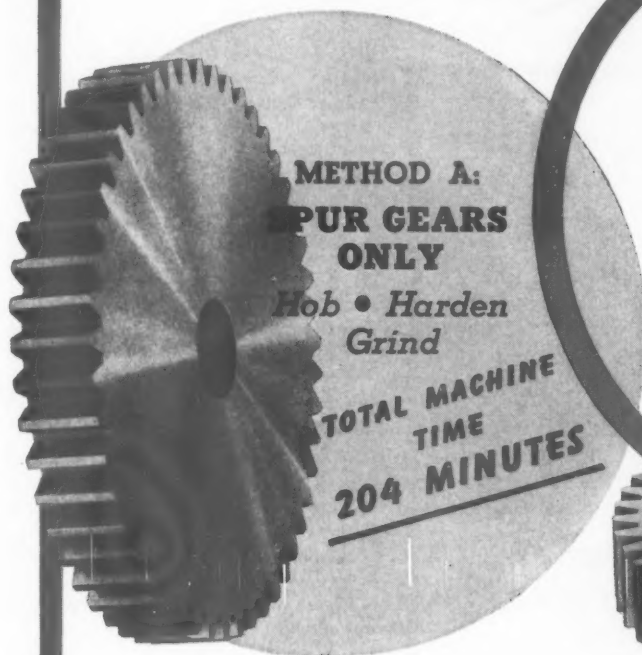


Crude Bomb Made from Pipe  
Commonly called a Pineapple.



# TWO WAVES TO FINISH A HARDENED GEAR

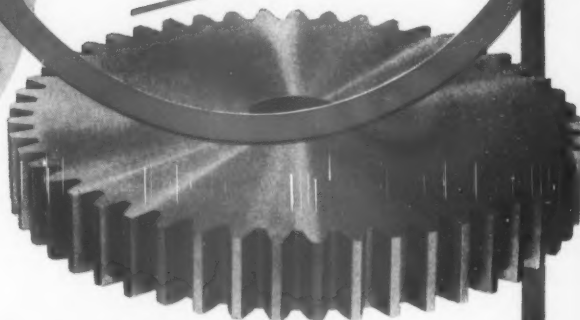
Take, for instance, a 12" gear with a 2" face, hobbled with ample stock for the correction of both hobbing and fire distortion errors. Its final overall error must not exceed .001".



**METHOD B:  
SPUR OR  
HELICAL GEARS**

*Hob • Shave  
Harden • Lap*

**TOTAL MACHINE  
TIME  
104 MINUTES**



## AND THAT'S NOT ALL

Method A is not only far more expensive but results in a high percentage of scrap due to surface checking of the teeth. It was abandoned years ago by practically all progressive automotive manufacturers and replaced by Method B which leaves the tooth surface unchecked and with a smoother, more accu-

rate surface. Men responsible for production results are not inclined to do a job the wrong way, especially when it costs more.

Red Ring Gear Shaving and Lapping machines are found wherever modern gears are produced economically.

**NATIONAL BROACH AND MACHINE CO.**

5600 ST. JEAN

DETROIT, MICHIGAN

# STEEL CAPACITY; DEFENSE HEADACHE

As steel production reached an all-time high last month, new orders came in with such force that delivery dates were moved forward to late spring and the industry's backlog grew bigger than ever. Thus began to crystallize a major industrial problem arising out of the Defense Program. Some government officials have repeatedly called for an additional 10 million tons of capacity in order

that mounting domestic consumption as well as defense production may be handled.

Arrayed against the expansion program are steel company executives who believe present capacity to be adequate, and generally assert that if it isn't they would prefer a curtailment of consumer production rather than enlarge plants to a point where, in post-war let down, idle

capacity might become an unbearable burden. Spokesmen for the industry place our defense needs at 7 million tons a year, British needs at 8 million, and other export needs at 5 million. With productive capacity for the entire industry now at about 83 million tons, this would leave 63 million for domestic requirements, more than ever has been used in this country.

Government economists, on the other hand, estimate British needs at 27 million tons per year and our own defense needs at a like figure. That would leave for non-defense production only 29 million tons. Compare this with a domestic consumption in 1937 of 30 million tons by the automobile, railroad, container, machinery, and building industries alone.

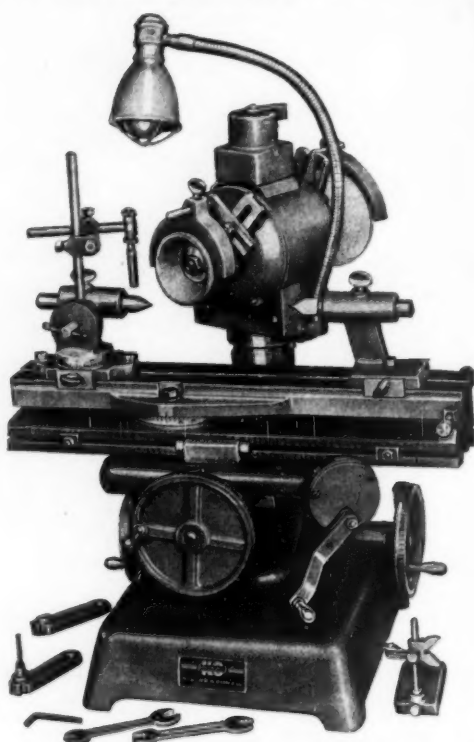
Since both of these highly conflicting views cannot be correct, the Office for Production Management has appointed Gano Dunn, \$1 a year engineer from the J. G. White Engineering Company, to survey the needs of various industries and arrive at a basis for arbitration of the dispute.

A minor note in this symphony of discord was struck when the C.I.O.'s Philip Murray charged that a handful of insiders was grabbing defense business, that 3 million tons of capacity still lay idle in smaller plants. Somewhat grudgingly, the Iron and Steel Institute admitted he was right.

But idle capacity meant little to jittery manufacturers who were unable to get delivery upon needed stock. Steelmakers, well aware that production has fluctuated from 92 per cent of capacity in 1917 to 19 per cent of capacity in 1932, could be counted on to oppose plant expansion so long as defense needs can be met by curtailment of civilian demands. Government economists, seeking a minimum of unemployment and a maximum of consumer production, could be counted on to favor a 10 to 20 million ton increase in capacity. Appointed in preparation for what might lie ahead was a five man steel priorities board—the first step in the direction of a rationing of steel for consumer production.

Amidst all these forces moves bespectacled engineer Dunn, veteran of last summer's fight to expand the TVA. Awaiting the results of his analysis and the presentation of his report, the Great Debate recessed.

## The NEW Model A600 Tool and Cutter Grinder



A new addition to the **KNOCK-OUT** family! Its specifications follow: Distance between centers 16"; Swing over table 6 1/4"—[with 1" raising blocks 8 1/4"]; Longitudinal table movement 11"; Cross feed 3 1/2"; Vertical feed 7"; Center stop fitted with knurled adjusting screws for accurate setting of end stops. Base provided with leveling screw, motor with reversing switch. Net weight 195 pounds; shipping weight 250 pounds.

Ask us for Bulletin TCG41-2TE for full description

## K. O. LEE COMPANY

ABERDEEN, SOUTH DAKOTA • U.S.A.

# EASY TO SELECT . . .

For  
**STEEL  
CUTTING**

STANDARD TOOLS ARE  
COPPER  
COLORED

For  
**CAST  
IRON**

or Brass, Bronze, etc.  
STANDARD TOOLS ARE  
ALUMINUM  
COLORED

## For 80% OF ALL TURNING, FACING, BORING JOBS

For simplified carbide grade selection and instant identification Carboley STANDARD tools for STEEL cutting are copper colored and, for cast iron, brass, etc. aluminum colored.

Designed for "universal" use on 80% of all turning, boring and facing applications Carboley standard tools comprise but five styles in three grades—grade 78-B for general purpose use on steel, grades 44-A and 883 (for extra long life in rigid machines) on cast iron, etc.

These new standards are easy to

select and easy to use. Each tool comes to you ground and ready for use. Chip breaking, too, has been simplified. Each steel cutting tool, styles 4, 7, 13 and 14, is supplied with a "universal" chip breaker already ground in. With each tool is packed a vest-pocket size operators' instruction booklet with complete, condensed operating and maintenance data.

For wider, more profitable use, maximum economy, easy ordering, simplified stocks and FAST deliveries—use Carboley STANDARD tools. Write for catalog GT-125.

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Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Worcester, Mass.  
Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

# CARBOLEY

Reg. U.S. Pat. Off.

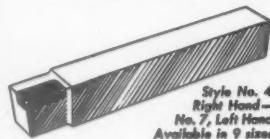
## STANDARD TOOLS



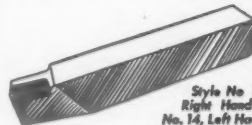
Look for this triangular trade mark on tools you buy. It is your assurance of genuine Carboley cemented carbide.

FEBRUARY, 1941

### CARBOLEY STANDARD TOOLS For "Universal" Use



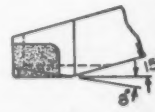
Style No. 4,  
Right Hand—  
No. 7, Left Hand.  
Available in 9 sizes.



Style No. 13,  
Right Hand—  
No. 14, Left Hand.  
Available in 5 sizes.

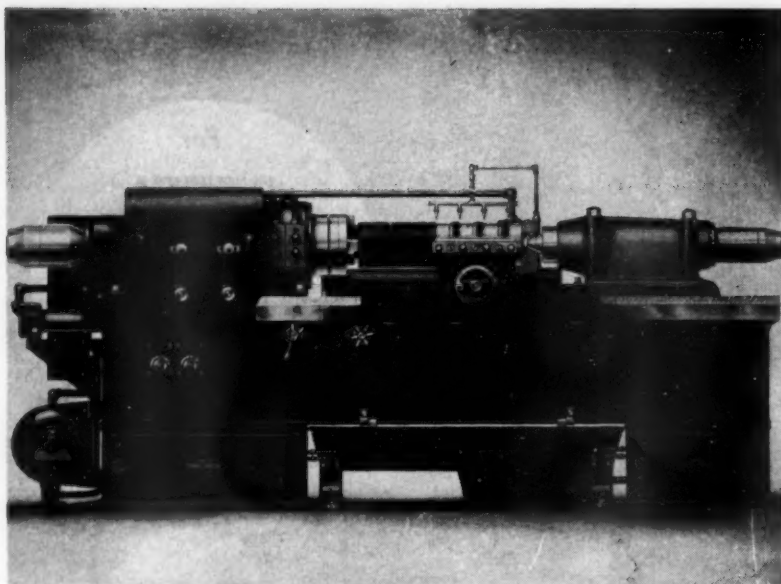


Style No. 1—  
Available in 9 sizes.



Steel Cutting Tools  
Styles 4, 7, 13, 14  
have ground-in chip  
breaker as illustrated





During the last war, Stanley Sparks designed and submitted to the Allied Governments a lathe for turning shells and guns. Of extremely simplified design, this lathe eliminated approximately forty per cent of the parts formerly used in a general purpose lathe. The lathe won the approval of the Allied governments and within four months machines were being delivered in volume. Thirty-two different plants cooperated in producing this lathe during the last war. Today Stanley Sparks is surrounding himself with some of the personnel that was used in the production of this Simplex lathe before. A plan has been worked out in cooperation with the Ordnance Department whereby numerous well-established manufacturers will cooperate in the production of parts and assembly of the new Simplex Shell Turning Lathe.

# Shell Turning

## A Defense Project of the First Magnitude

**D**ESIGNED to perform all machining operations on all Shells from 75 MM to 155 MM is a lathe illustrated on this page. It will provide for multiple tooling and will carry tools and attachments which will enable it to produce as many as 5 distinct operations with one chucking and obtain maximum cutting speeds by the use of Tungsten Carbide Tools.

The Headstock Spindle is of the flange type for direct chuck mounting and rotates in heavy duty "Timken" Bearings. The O. D. of spindle at front end being 5" and 3½" at the rear. The spindle is operated through special steel gears with wide faces and dog tooth clutches and allows a drive of 75 H.P. motor maximum through a powerful silent roller chain. Smaller motors down to 10 H.P. are also available for operations requiring less power. Three spindle speeds are available to give maximum cutting speed required.

A separate hydraulic motor unit and pump is provided to give complete automatic operation of all feeds horizontal and cross as well as rapid traverse.

Through the adjustment of a dial mounted conveniently on front of machine, feeds are available from .008" to .040". Power hydraulic cross feeds are supplied independently of the longitudinal feeds, which eliminates the necessity for the use of any controlling cam feeds and simplifies the manufacture and operation of the lathe.

Operating from this same hydraulic power is the rotating cylinder which operates a wedge chuck through a draw bar and which was developed for this purpose by The Cushman Chuck Company. Suitable work holding Jaws as well as end stops and length gage bars are also a standard part of the chucking equipment. The chuck will be operated by a foot type valve in order to facilitate loading of Shell.

The tail center is operated through a hydraulic cylinder and through the medium of another foot valve conveniently located. This center is furnished as standard equipment as a live ball bearing center. A revolving roller bearing tailstock spindle is supplied as extra equipment.

Heavy duty, motor driven coolant pump is also supplied with large capacity.

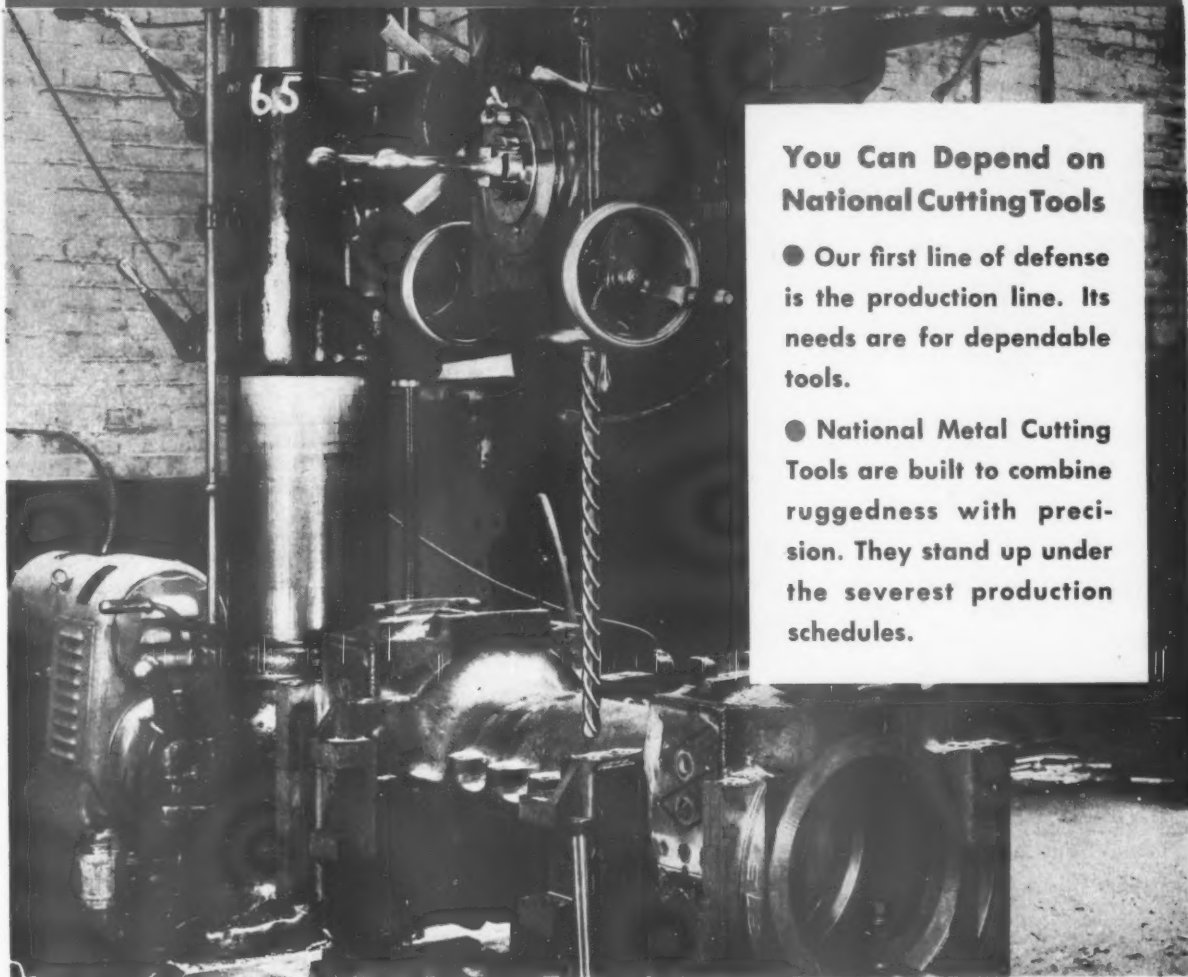
A generous size chip pan is mounted under the bed on a swivel and can be easily cleaned from the back of lathe and a sump tank attached thereto to carry an adequate supply of coolant compound.

Such operations as facing ends and boring require a holding fixture of the pot type consisting of two three jaw Scroll Chucks with suitable spacers which center the shell accurately from its outside diameter.

(For diagrams illustrating the operation of this lathe, please see page 56.)



# To Meet Today's Schedules— Tools Can't Be "BABIED"!



## You Can Depend on National Cutting Tools

- Our first line of defense is the production line. Its needs are for dependable tools.
- National Metal Cutting Tools are built to combine ruggedness with precision. They stand up under the severest production schedules.

# NATIONAL



TWIST DRILL  
REAMERS, ROSS  
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COUNTERBORES  
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# Shell

Illustrating the various operations performed, the method of holding tools

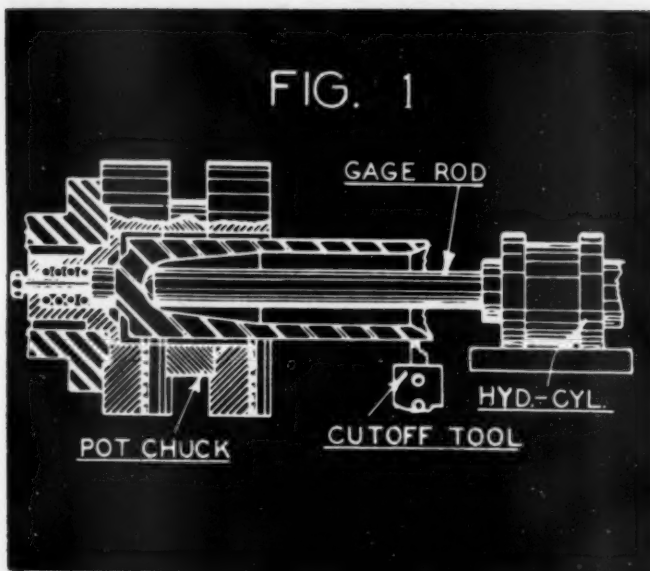


FIGURE I — Operation — Cut off open end and gauge for length

- (1) Shell is held in a double pot chuck
- (2) Hydraulic cylinder mounted on bed replaces tailstock and carries gauging rod
- (3) Shell pushed against stop on gauging rod by a spring plunger in chuck
- (4) Hydraulic power cross feed operates tool to cut off open end of shell to proper length from depth of hole.

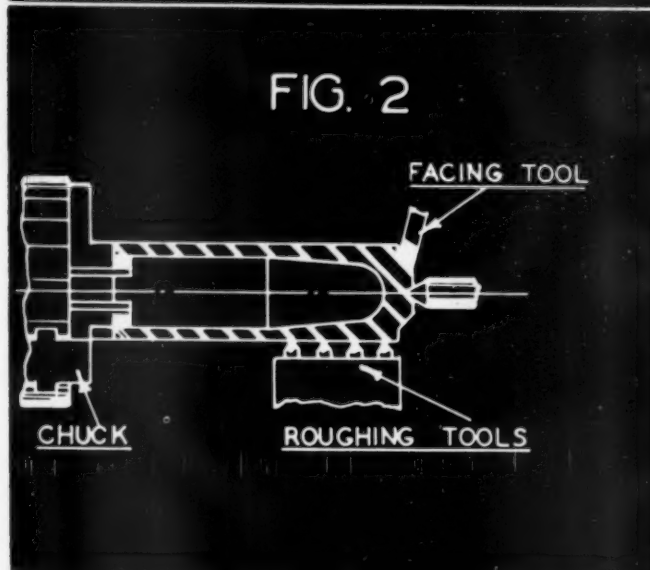


FIGURE II — Operation — Rough turn and face back end

- (1) Shell held in hydraulic operated wedge chuck
- (2) Rough turn outside of shell with four roughing tools in line
- (3) Hydraulic feed with rapid traverse and power cross feed
- (4) Hydraulic power operated facing tool mounted on back of machine for facing back end of shell.

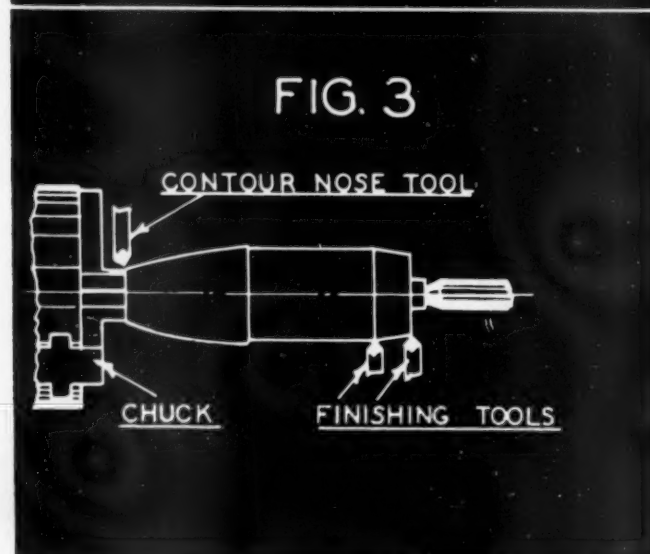


FIGURE III — Operation — Finish Turn Outside of Shell

- (1) Shell is held in power wedge chuck
- (2) Finish turn outside of shell with front finish tool front profiling tool working on back end of shell and back profiling tool working on nose contour
- (3) Hydraulic feed with rapid traverse and power cross feed
- (4) Hydraulic power operated profiling attachment on back of machine
- (5) Taper attachment on front of machine

## For National

THE TOOL ENGINEER

# Turning

## and the Tooling Set-up for Use of the Simplex Shell Turning Lathe

FIGURE IV—Operation—Finish bore, face and tap nose of shell

- (1) Held in pot chuck
- (2) Turret tool post carries bore and outside chamfer tool, reamer and inside chamfer tool and collapsible tap

Turret station 1—bore and outside chamfer

2—ream and inside chamfer

3—tap

Hydraulic longitudinal feed.

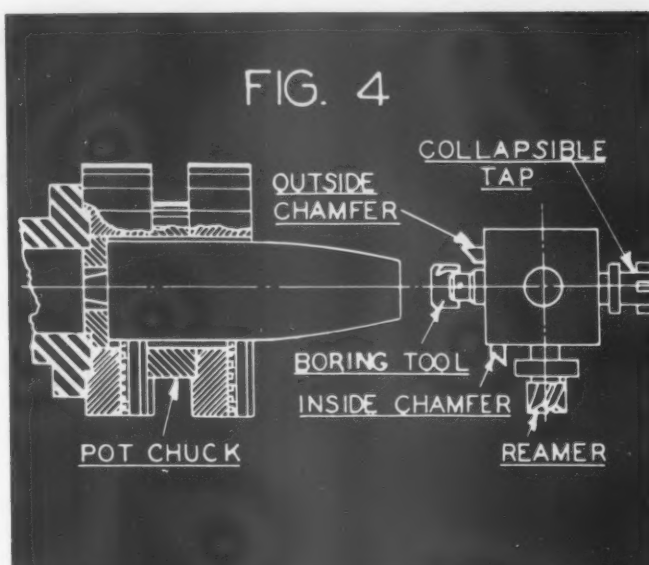


FIGURE V—Operation—facing back end of shell and grooving for rotating ring

- (1) Shell is held in pot chuck
- (2) Facing tool mounted on carriage and operated by power cross feed for facing back end of shell
- (3) Hydraulic power operated tool mounted on back of machine for cutting rotating ring groove.

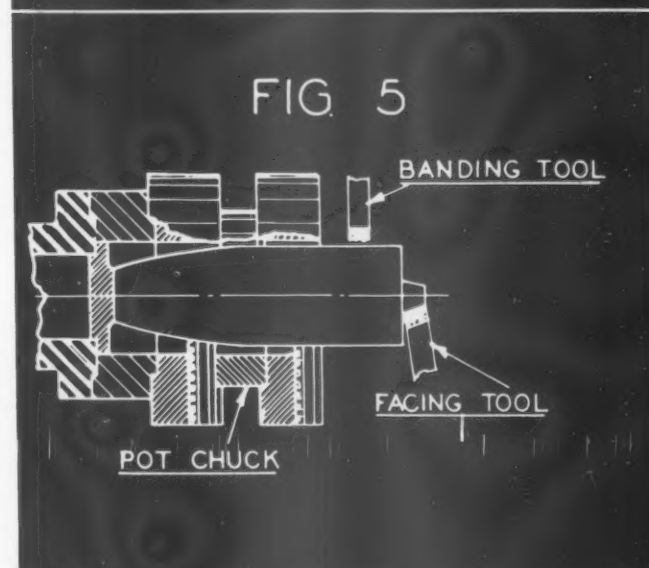
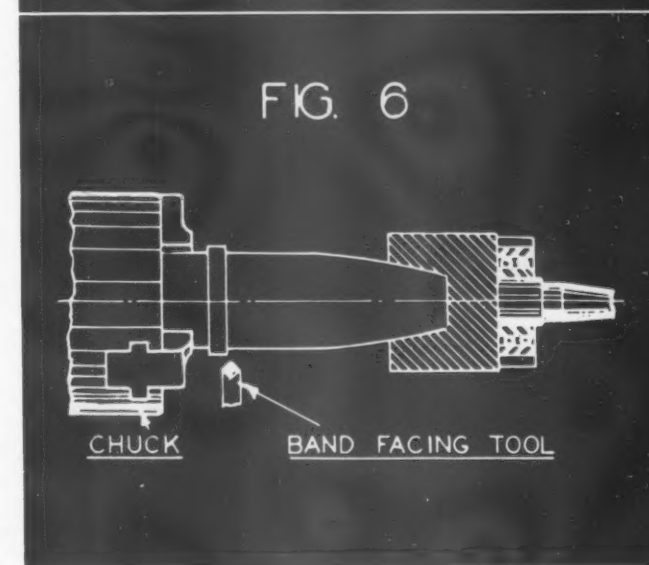


FIGURE VI—Operation—Facing rotating band

- (1) Shell is held in hydraulic wedge chuck and female ballbearing center
- (2) Single facing tool for facing rotating band
- (3) Hydraulic longitudinal feed with power cross feed.



# Defense

# Precision Grinding

**Presenting a picture analysis of some practical applications of the modern disc grinder.**

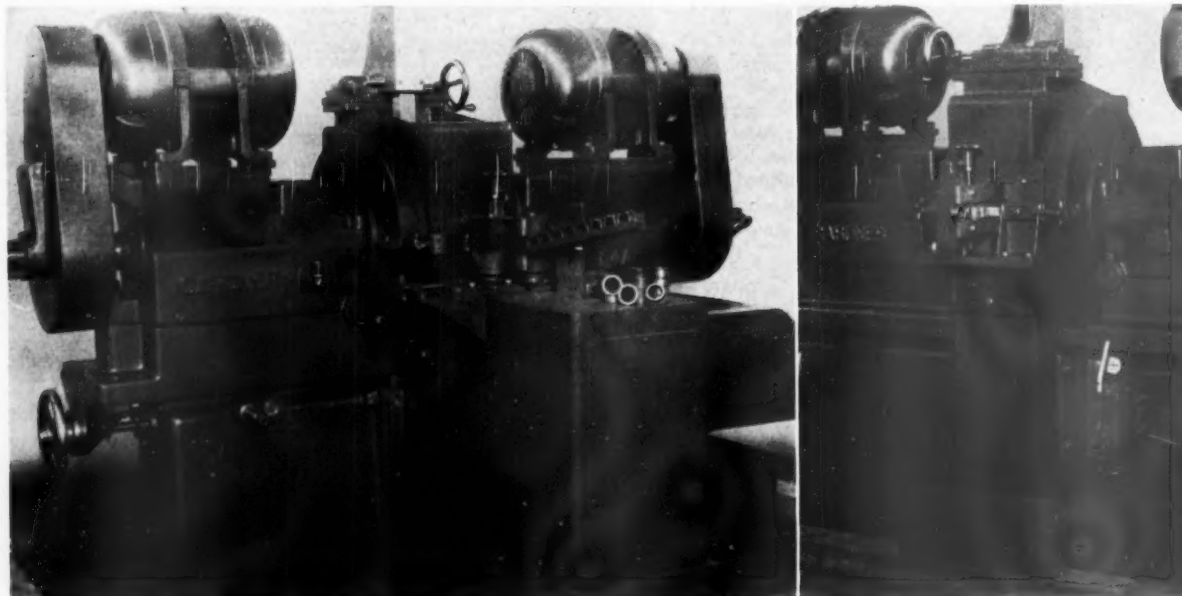
*Photos Courtesy Gardner Machine Company  
and Charles H. Besly and Company*

The essential thesis of mass production lies in reducing the fabrication of a product to a large number of simple operations, and then performing each one in its proper sequence with the utmost precision and rapidity.

On this and the following pages one type of machine tool, which performs a limited type of operation, is presented. You will see what great progress has been made towards greater precision and higher speed. You

will see how Tool Engineers in plants where these tools are employed have combined their talents with the men who designed the machines to produce ingenious variations of a basic tool—the grinding disc.

Each of these machines was especially designed to perform a particular operation and to fill a definite need. Each of them is now in operation somewhere in America, doing that job interminably, and producing parts at an astronomical rate.



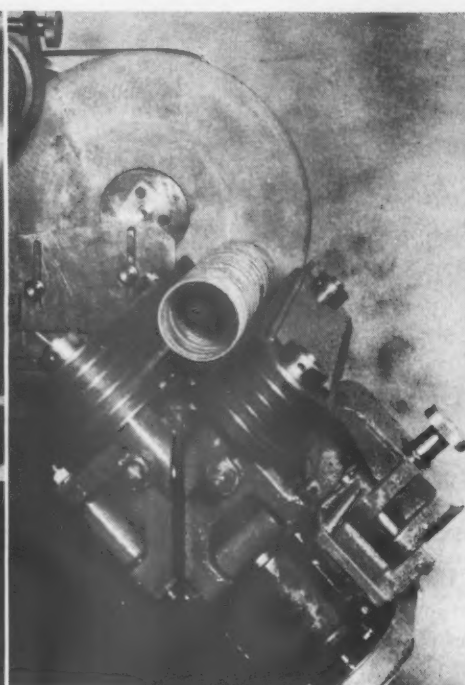
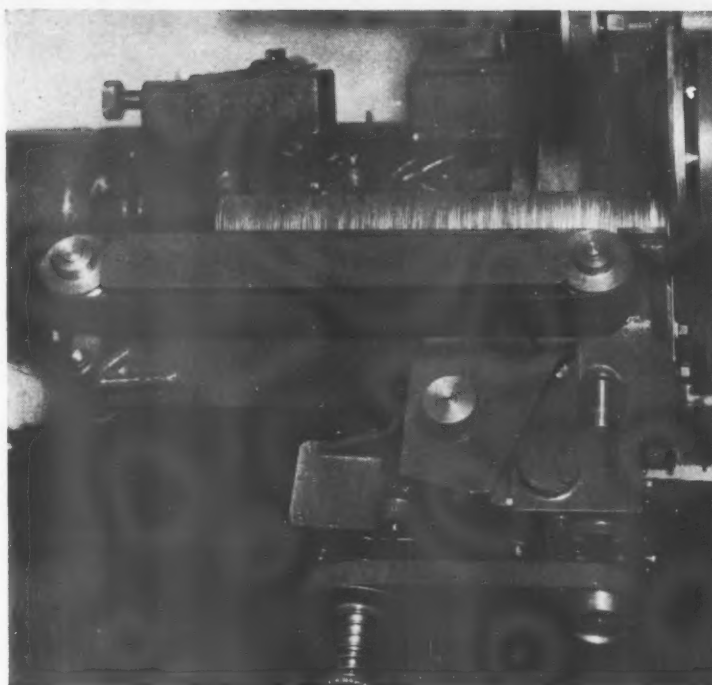
## **DOUBLE SPINDLE UNIT GRINDS TAPERED BEARING CONES**

This grinder is a double spindle unit used for grinding the sides of cones for tapered roller bearings. This tool weighs about 15,000 pounds. The tapered bearing cones are supported during grinding on two steel guide bars which extend clear through the machine, and the feeder sends them through between the opposed grinding members in a constant stream. They drop out at

the rear by gravity.

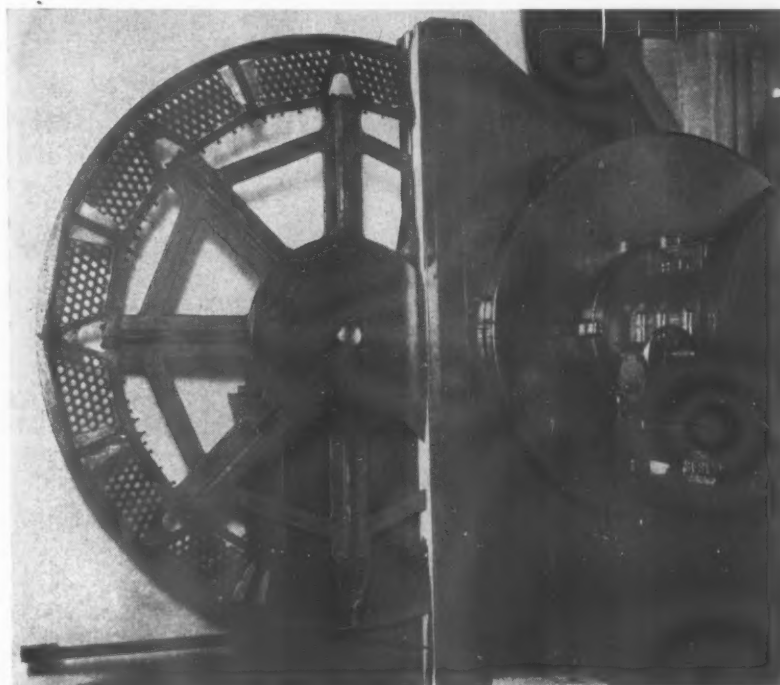
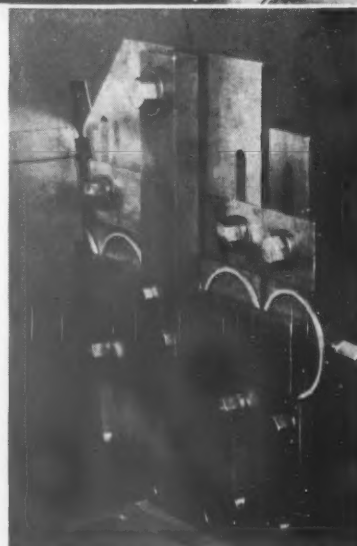
Grinding cones measuring approximately three inches in diameter remove .010 inches of stock over all at a rate of from sixty to seventy-five a minute. Tolerances are maintained three to five "tenths" (ten thousandths) for parallelism and .004 inches for uniformity.





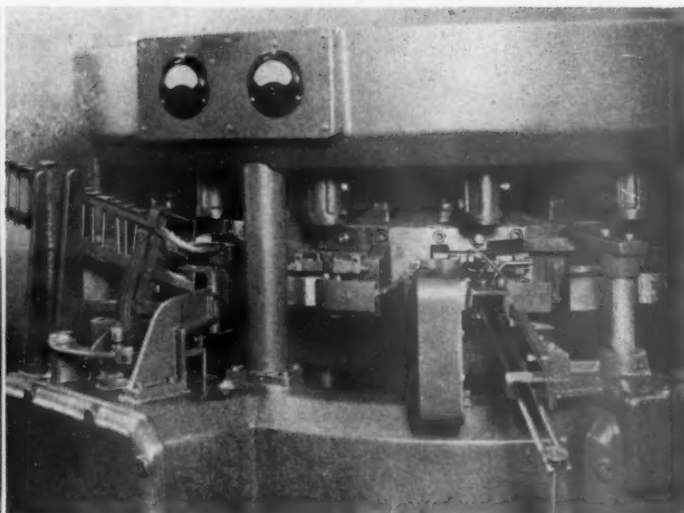
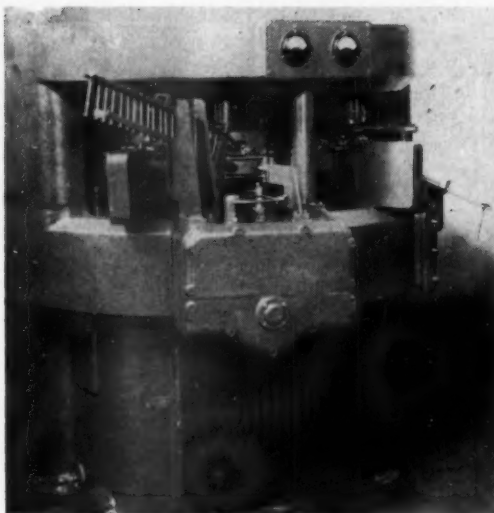
Illustrated above is an ingenious innovation for feeding piston ring castings. The grinder is a double spindle machine which grinds the two sides of piston ring castings. Piston rings are placed in a trough and from there fed into the machine. A problem arises in finding a way to

load this trough without interrupting the feeding. As can be seen this was done by constructing the trough of moving Vee belts. There need be no weight or cross head to force rings into the machine, the pull of the belts does that. The operator can fill the trough without interrupting the flow of work. Right: Ground rings emerging from the



back of the machine. Production may be varied from 150 to 450 rings per minute.

Long ago the operators of carnivals discovered that a ferris wheel could be held steady by the use of a cable drive running around the periphery. On the grinder at left a ferris wheel drive is used to prevent vibration of the 108 in. feed wheel which supplies 2500 automotive valve springs per hour. In variations of this type of machine the feed wheel is horizontal, which simplifies loading.

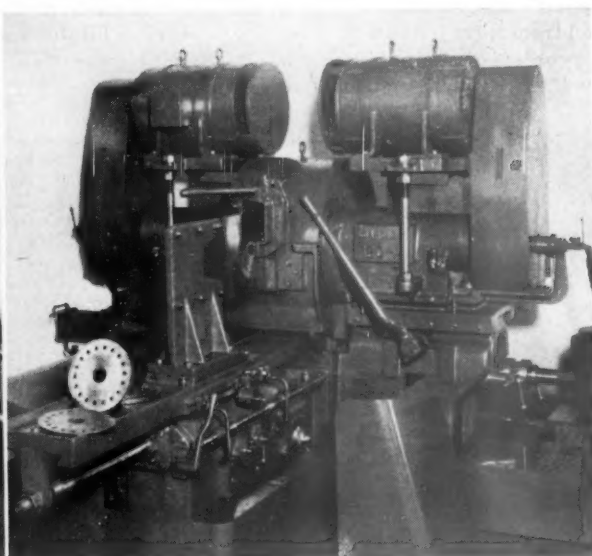
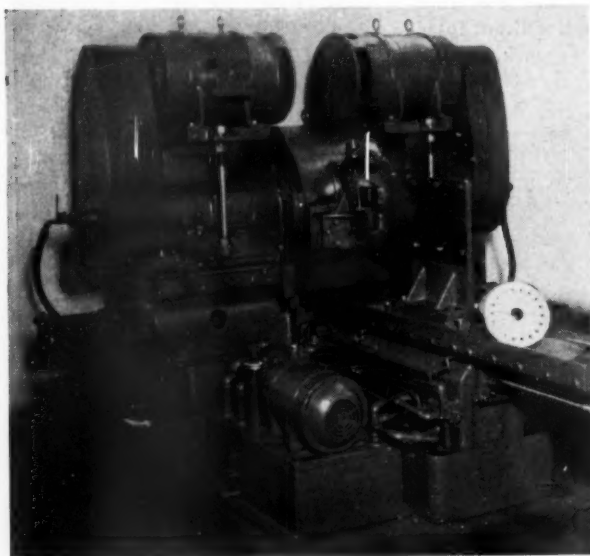


### SINGLE PURPOSE GRINDER FOR VALVE STEMS

A grinder of this type may be described as single purpose for it could not be economically adapted for uses other than that for which it was built. This tool finish-grinds the stem end of automobile valves at a rate of 30 to 35 per minute. There are two grinding heads each 18 inches in diameter operating in the horizontal plane. Valves are carried over the cutting discs by a rotary carrier. Loading and unloading are

automatic from chute type holders.

The first wheel roughs off the surface, removing .004 to .005 inches of stock, while the finishing wheel removes .001 inches. The accuracy attained in this instance amounts to three "tenths" for squareness with stem and seat, and plus or minus 7.5 "tenths" for uniformity of length.

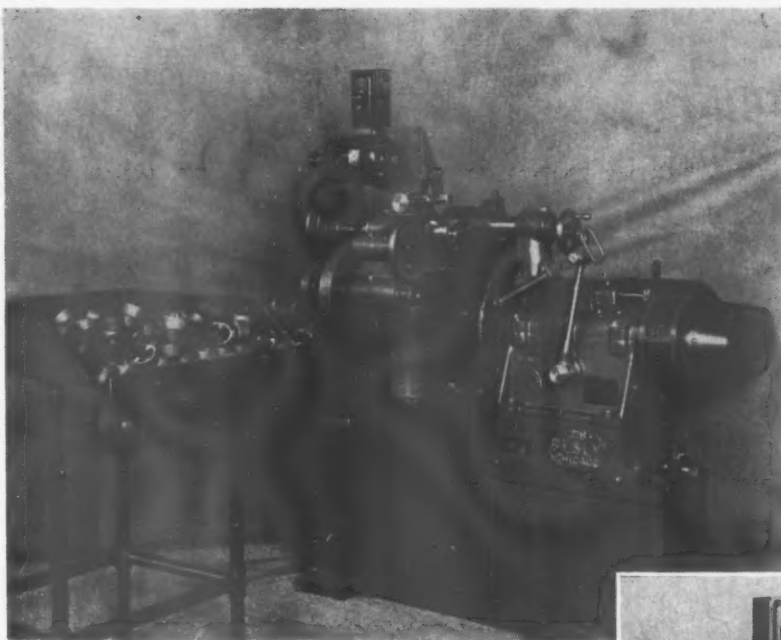


### EIGHTY SPRING STEEL CLUTCH DISCS PER HOUR

An entirely different type of situation is illustrated here, in which a double spindle grinder handles spring steel clutch discs. These discs are held in a blade type fixture which oscillates automatically while the grinding heads close in hydraulically. The part is held loosely in the fixture and spins during the grinding

operation. The grinding takes place under a continuous flow of coolant.

Discs are ground at the rate of 70 to 80 per hour and are held within .001 inches for parallelism, and .003 inches for uniformity.



## BELT PROVIDES CONTINUOUS FEED

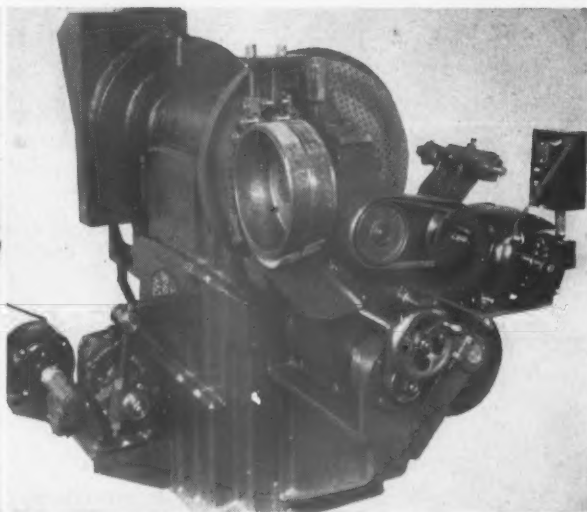
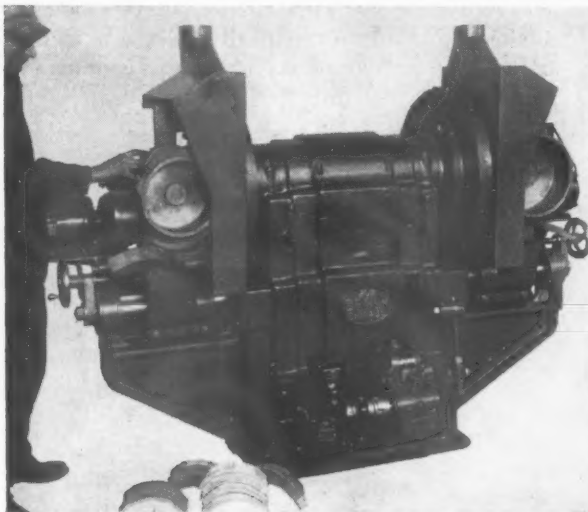
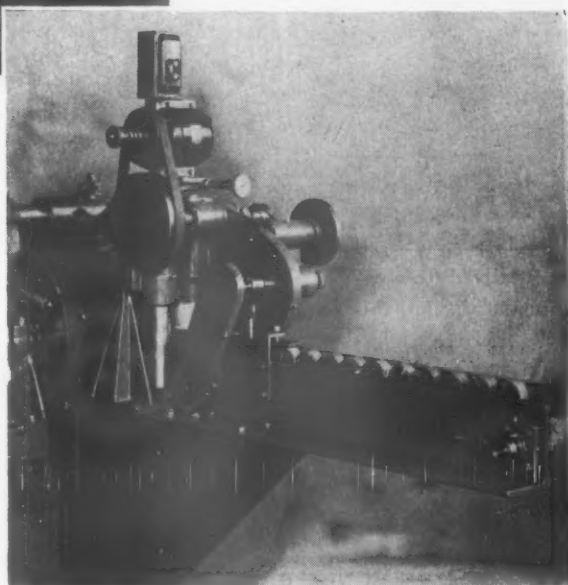
A variation of the Vee belt trough feed used on piston rings is employed on this grinder for handling shock absorber castings. A single wide belt supplies the pull to keep the castings constantly feeding into the machine. They are loaded onto the belt from a convenient table. The illustration below shows the back side of the feed line with table removed. Grinding is done with two 20 inch discs, and production ranges from 1500 to 1800 pieces per hour.

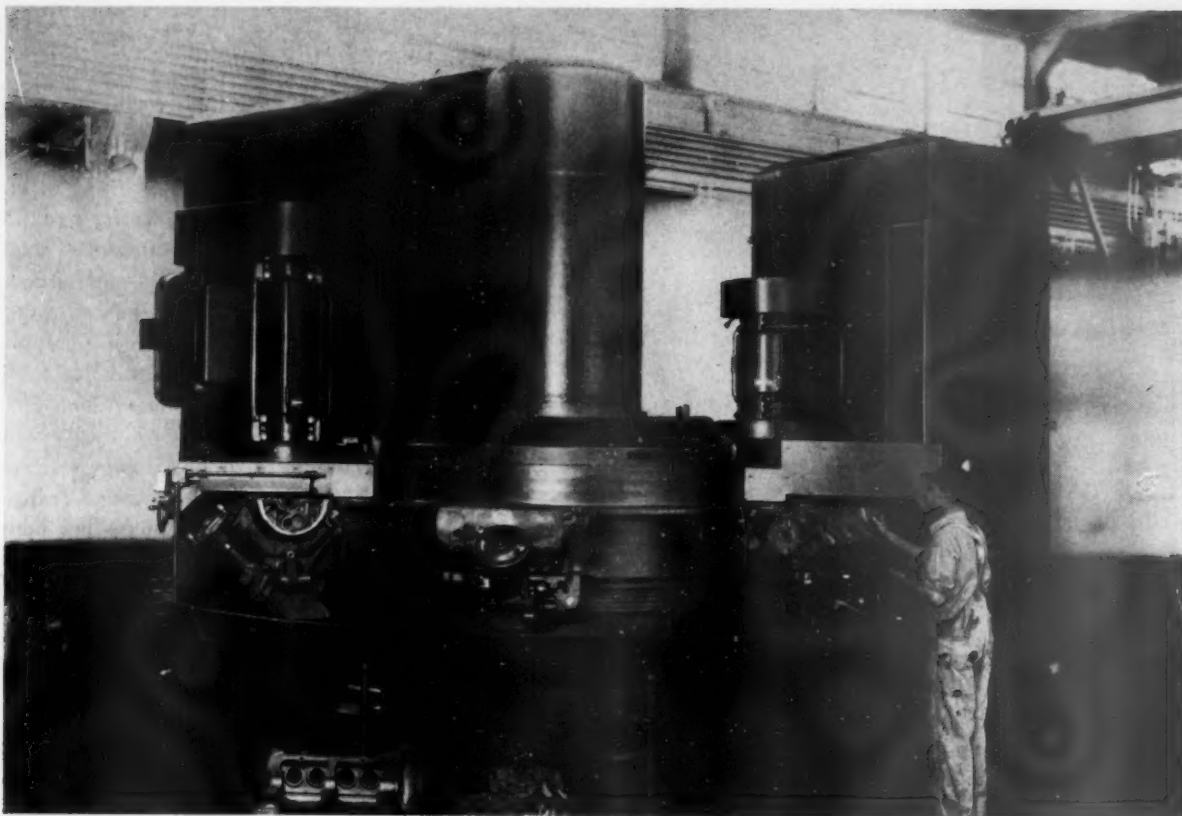
## DESIGN SHOWS VERSATILITY

Another example of the versatility shown by engineers in designing these tools is the grinder illustrated below. It is equipped with power oscillated tables and special fixtures for grinding brake linings.

The brake linings are stacked on rotating drums as shown below left. Lugs on the drums pick off one piece at a time and carry it past the grinding disc. The oscillating feature keeps the grinding members true. A close up view of the drum is shown below right.

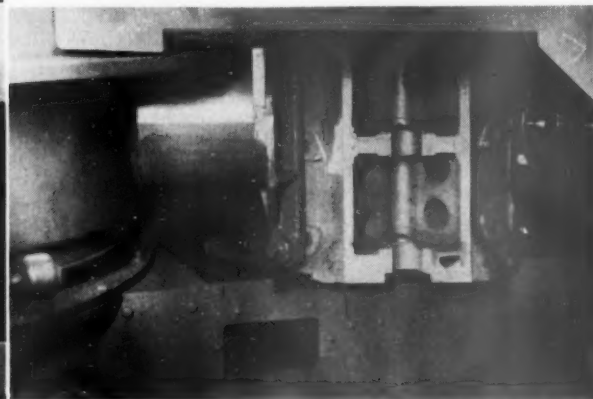
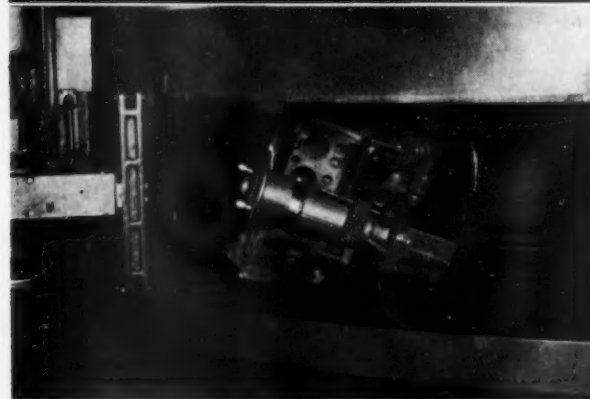
All of these grinders were especially designed for various types of precision work. For an example of a grinder which was designed for an entirely different type of work, turn to the next page.



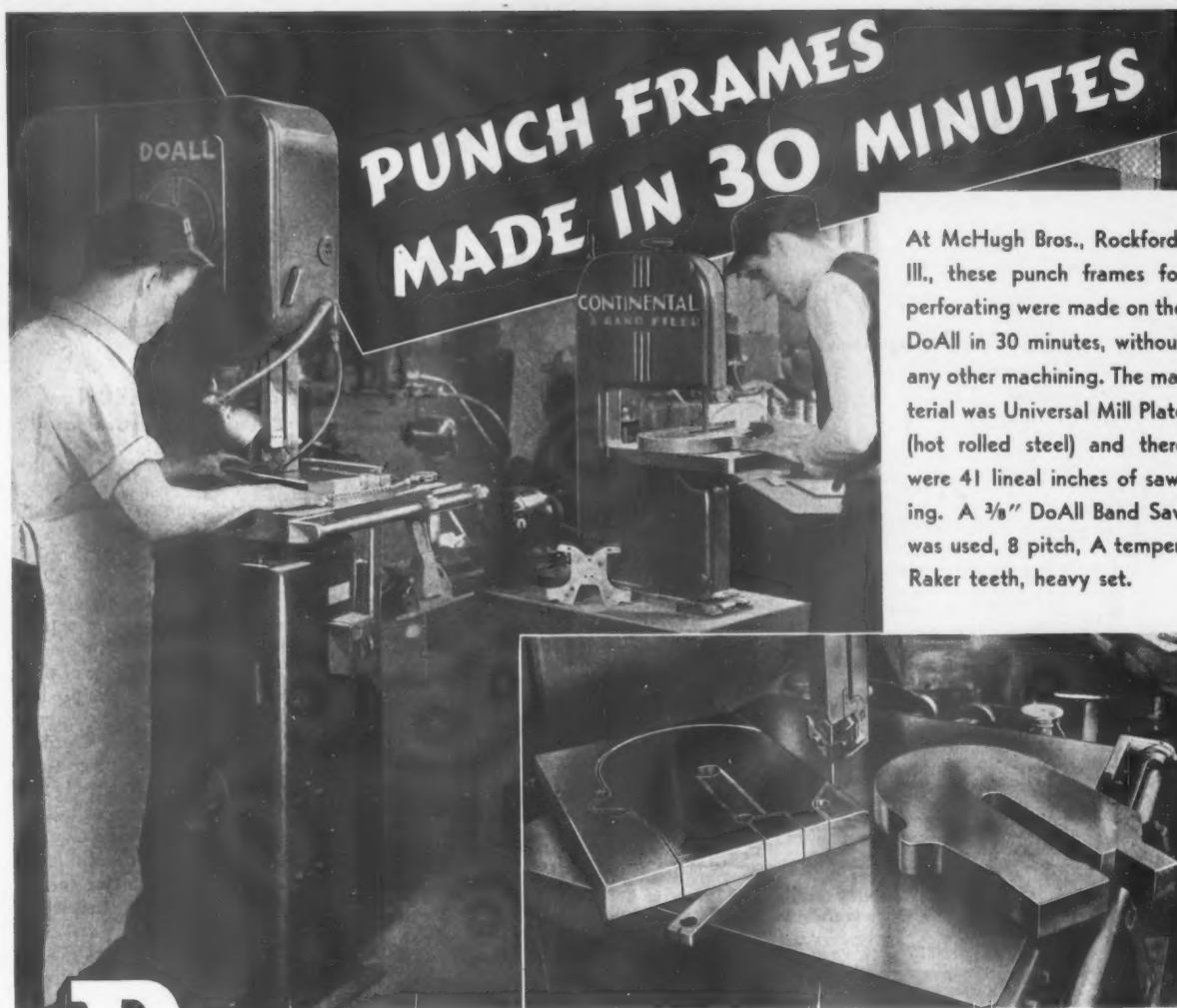


Totally different from the machines shown in the foregoing pages, this grinder is used for rough snag-

ging work. Weighing nearly 35 tons, this machine carries four grinding wheels. Two are on the left hand column, mounted in line, for snagging the bottom surfaces of V-8 cylinder blocks; and two on the right hand column, one above the other, for snagging both ends simultaneously. A rotary carrier with six work stations, each carrying a quick-acting clamp, is employed. The block, bottom surface up, is carried beneath the first two wheels (one taking a roughing cut, and the other a lighter finishing cut) as indicated at left. It is then automatically indexed (below left) 90 degrees for the end grind. Following this operation (below right) it is automatically indexed to its original position for unloading. With three operators the grinder will handle five blocks per minute.







At McHugh Bros., Rockford, Ill., these punch frames for perforating were made on the DoAll in 30 minutes, without any other machining. The material was Universal Mill Plate (hot rolled steel) and there were 41 lineal inches of sawing. A  $\frac{3}{8}$ " DoAll Band Saw was used, 8 pitch, A temper, Raker teeth, heavy set.

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**CONTINENTAL BAND FILER** (shown at the right in picture)—Does continuous band filing, which means faster, better, smoother filing on all materials from tough high-carbon steel to brass, wood, etc. 12 styles of file bands are available,  $\frac{1}{2}$ ",  $\frac{3}{8}$ ",  $\frac{1}{4}$ " wide, flat, oval or half round.

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An adequate tool crib control system will prevent serious delays in tool service

# How to Avoid Tool Shortage

**TO**

JAN 60  
FEB 52  
MAR 25  
APR 33  
MAY 42  
JUNE 35  
JULY 4

**Inventory**

DATE IN OUT BAL DATE IN OUT BAL

8/5/38 20

**MONTHLY TOOL TURNOVER REPORT 1938-1939**

TOOL NO	DESCRIPTION OF TOOL	PRESENT INVENTORY	PRICE	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MINIMUM STOCK
9721	W.S.S. Taper Shank Drills	10/16/38														12
9801	W.S.S.		20	31	50	52	25	33	42	29	47					12
9802	W.S.S.		9	31	21	17	22	12	18	21	14					5
9803	W.S.S.		6	36	18	6	3	10	9	3	9					5
9804	W.S.S.		8	36	77	71	60	84	74	73	83					9
9805	W.S.S.		9	81	9	23	8	10	10	10	15					6
9806	W.S.S.		11	81	28	39	37	26	30	27	25					6
9807	W.S.S.		8	90	15	18	9	17	19	25	12					6
9808	W.S.S.		12	90	61	55	50	54	44	36	41					9
9809	W.S.S.		8	100	8	5	14	11	18	16	13					6
9810	W.S.S.		9	100	33	35	33	62	32	41	30					6
9811	W.S.S.		13	109	96	94	99	71	71	69	66					12
9812	W.S.S.		21	109	52	61	52	67	63	44	54					12
9813	W.S.S.		14	119	3	6	3	6	2	2	7					4
9814	W.S.S.		11	119	41	36	31	36	32	50	52					9

Inventory and Activity Cards, and Turnover Report  
Gone is the guesswork.



Crib Control in Use  
It doesn't shorten delivery period, does assure maximum use.

by **DAVID CAMERON**  
The McCaskey Register Company  
Alliance, Ohio

**T**OOL service may become a serious production bottleneck in many plants because of the failure of their tool crib systems to meet present production demands. Many small tools ordinarily available from stock already are difficult to secure. Excessive breakage is resulting from the inexperience of new operators and the carelessness of others. Production frequently is delayed while men and machines wait for mislaid tools. Systems considered adequate for former operating conditions are responsible for numerous production losses, that can easily be prevented.

No system will shorten the delivery period required by tool manufacturers, but the maximum usage of all the tools available in a shop or a plant can be assured. It has been customary in many organizations for workmen to retain favorite tools, even though they are used infrequently. In others, tools are left on machines or benches, more or less permanently. One otherwise efficient organization recently adopted improved tool crib methods and found that they had several times the tools necessary for their requirements, when those not in actual use were returned to the cribs.

Modern control provides a record of the tools in the possession of each employee, when each tool was issued and its location. With this information it is not difficult to keep tools in circulation, to be certain that every tool not in use will be immediately available when there is a call for it. They should and will be in the crib and not in some employee's tool box.

In most plants, tool cribs are stocked and replacement orders based entirely on estimates of the quantities needed for production. However sound the estimates may be, the natural tendency is to play safe. As a result, the inventories of nine

out of ten cribs are from 30 to 50% greater than necessary. This is particularly undesirable when the delivery of many tools is extremely slow. The monthly turnover or usage of each tool item is a much more accurate basis.

Recent experiences in several representative plants using a Tool Crib Control illustrate how tool service actually can be improved with a much smaller inventory than originally was considered necessary. One reports that faster service is provided with half the tools formerly carried for the same volume of production. The Tool Engineer in an eastern aviation plant, where employment recently has increased from a few hundred to several thousand states that breakage and loss have been held at a surprisingly low level during the period of hectic expansion. A Michigan manufacturer of screw machine parts and brass forgings is saving hundreds of hours a week for set-up men, machine operators and crib attendants, according to the Tool Supervisor, who adds that their monthly turnover record removes all guess-work from tool ordering and that their inventory has been substantially reduced.

### Handling Tool Orders

This control is provided through the three-way distribution of a tool order for each tool loaned to an employee. The first copy indicates what tools have been issued to each employee. The second is the employee's record of the tools for which he is responsible. The third copy gives the location of every tool that has been issued.

The three copies of the tool order are made at one writing with carbon-backed forms; they are white, yellow and pink in color for quick identification. The first and third or white and pink copies are cross-filed in equipment specially designed to secure maximum speed in their handling. This speed of operation obviously is essential to the success of the entire system. In one portion of the equipment a clip spring filing position is provided for each man drawing tools, identified by his payroll or clock number. In another, a similar position is provided for each tool item in its various sizes. Slip holders are placed on all machines and work benches for the employees' yellow copies.

Tools are issued in less time than it takes to describe the procedure. The employee writes out an order for each tool drawn. He is given the tool and the yellow copy of each order with no appreciable loss of his time or the production of the machine for which the tools are intended.

The original or white copy is filed at once under his clock number. This provides a record, instantly available at any time, consisting of signed receipts for each tool drawn. The speed with which

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# LIBERTY MAY LIVE

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they may be checked or men cleared is obvious. There can be disputes about incorrect postings or misplaced or missing checks. No one questions the accuracy of his signed orders.

The date on the order enables the crib attendant to identify employees who accumulate more tools than they actually need. Procedure for enforcing the prompt return of tools not in use is obvious. How this increases the availability of tools is equally apparent.

The triplicate or pink copy of the order is filed in the tool section according to the item drawn. For example, slips representing two inch and three inch micrometers would be filed under Nos. 561 and

562. These records show at a glance what men have each of the mikes and how long they have been out. The superintendent of a large plant recently mentioned to the writer that it frequently has been necessary recently to open the tool boxes of a score of men to find a few tools needed for a second or third shift. They would have been located in a few moments with this information.

#### Tools Kept Sharp

The return of tools takes only a few seconds. The employee presents his tools with the corresponding yellow slips. The crib attendant lays them aside and turns to the employees' file. He removes the

white copy for each tool and hands them to the employee who destroys them with assurance that his responsibility has been cleared. Each set of tool orders is numbered serially so that it is unnecessary to read the entire slip; the white copy is identified by the number of the yellow one. Contrast the speed of this operation with conventional systems that require a trip to each of the bins from which the tools were withdrawn.

There is another advantage here that is not immediately apparent. The crib attendant ordinarily places returned tools in the bins, when he goes to them for the employees' checks. This provides little or no opportunity to determine whether the tools need sharpening or other reconditioning, particularly if several men are waiting for service at the crib window. When modern control is in use, tools are laid aside with the identifying yellow slips until all of the men at the window have been served. They are then examined thoroughly and only those in good condition are returned to the bins. The others are reconditioned before they can be made available for use. Obviously, this has the effect of cutting down the production of parts that must be reworked or scrapped. Since maximum production is based on the use of sharp tools, it also eliminates loss of production due to faulty tools.

#### Location Indexed

No system is complete that fails to index the location of all tools whether in the crib or in some overflow storage. Too many plants are dependent on the memory of trusted employees for this important information — frequently, on the memory of one man. Inevitably, this causes delay sooner or later. Production schedules are upset and machines and operators are idle while tools are being located. The modern system provides a visible index that can be consulted in a moment for the location of tools and the names and numbers of employees authorized to draw them.

The inventory of each tool item is recorded on an Inventory and Activity Card. This card is filed permanently in the clip spring filing position allotted to each item. When tools are added to the crib stock the total naturally is increased as shown; when they are scrapped the total is reduced. This is another record, not available in many plants, that is particularly essential under present conditions.

The same card is used in determining and recording the monthly activity or turnover of each tool item. As already stated, the crib attendant immediately gives the white copies of his tool orders to the employee returning tools. The corresponding pink slips provide an additional record. When there is no one at



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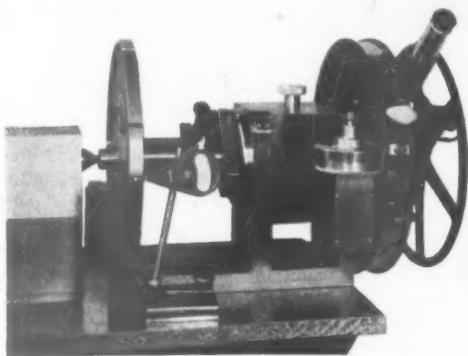
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## TOOL SHORTAGE

(Continued from preceding page)

the crib window to be served, they are quickly located by referring to the yellow copies returned with the tools. The latter now have served their final purpose and may be destroyed. The corresponding pink slips are removed from the front of the Inventory and Activity Card and placed back of it. The slips in front of each card now represent tools that are in use; those back of it, tools that have been used and returned during the month.

Once a month, the slips behind each card are counted and the number entered on the back of the card. This provides a record of the activity or turnover of each tool item. A periodical report of this data for all the items in the crib constitutes a factual basis for determining the minimum inventory that must be carried to serve maximum production demands. It is much more reliable than the best possible estimate. As expressed by the tool supervisor in a well-known machine tool plant, it removes all the guesswork and the night-mare from tool ordering and indicates clearly where pressure must be applied, if it is at all necessary.

During more normal times, scores of manufacturers have used this information to eliminate unnecessary tool items and reduce the inventories of others. In some busy plants today, such economies may be less important than the assurance that sufficient tools are available for all production requirements. Even under the pressure of peak production, however, the data is helpful in preventing the accumulation of items that may be purchased simply to play safe.

## Keeping Breakage Down

Experience in hundreds of plants has indicated over a period of years that 10 or 15% of the employees drawing tools normally are responsible for 80 to 85% of tool breakage. The employment of untied operators and the carelessness accompanying rush work are resulting in an unusual amount of breakage. It is probable that a larger percentage of employees are presently responsible for it.

The use of a breakage report repeatedly has resulted in reducing these unnecessary losses. The employee who breaks a tool is required to make out a report and secure the approval of his immediate superior before the crib attendant will replace it with a new one. The knowledge that breakage is being checked is sufficient to induce most workmen to handle their tools more carefully. Most users of the system report that breakage is reduced at least 25%, as soon as it is adopted.

Nevertheless, a complete record of the number and value of the tools broken by each employee weekly or more frequently is desirable. It enables supervisors to weed out chronic offenders and to help others who are in need of instruction or assistance. In one plant where the breakage of expensive tools was particularly serious, copies of the original reports were sent to the foreman of each department daily. Substantial reduction resulted, as soon as foremen were in a position to discuss reasons for the breakage soon after it occurred. Additional copies of the report serve numerous purposes. One usually is used to adjust inventory records. Another frequently serves to check the performance of tools that are being tested in some way.

Adaptations of this procedure are used to simplify the issuance of special or numbered tools, blueprints, jigs, fixtures and complete set-ups or kits of tools. Requirements frequently differ in numerous details in several departments in the same plant. The system is sufficiently flexible to meet them without changing its basic principles.

The importance of the tool crib as an essential unit in efficient production frequently is overlooked. If inadequately controlled, tool service may cause numerous unnecessary delays and add materially to production costs; may even become a serious production bottleneck.

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The No. 11 Blanchard Surface Grinder was designed especially for lowering the cost of grinding dies, jigs, fixtures and small parts—with finish, accuracy, and speed to satisfy modern production requirements.

Tool makers—die makers—don't miss this opportunity to get information on the machine that was designed as you would have it—for your own requirements! Send the Coupon today!

Without obligation, please send me my copy of the No. 11 Blanchard Surface Grinder Catalog.

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Company \_\_\_\_\_

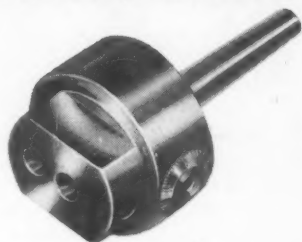
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City \_\_\_\_\_ State \_\_\_\_\_

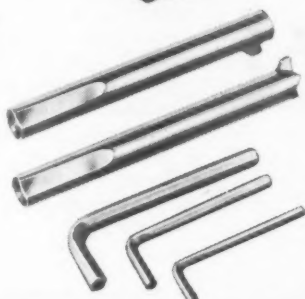
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Furnished with male or female  
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**MODEL "AA" MAKES  
A PLACE FOR ITSELF  
WITHOUT DELAY » »**



• Precision methods throughout manufacture of optical instruments is an obvious necessity, and here is a new Cleveland *Single Spindle Automatic*, Model AA, recently installed at the Spencer Lens Company plant at Buffalo, at work on precision parts of a microscope. The accuracy of optical adjustment depends entirely upon the exactness of fit of the many parts that go into the assembly. Spencer Lens Company depends upon Cleveland Automatics for a great variety of such parts made in small lots and held to close limits of accuracy. Cleveland Model AA machine is built in 1½-inch and 1¾-inch capacities. • Cleveland Model A machine has a four-speed motor drive, providing four automatic spindle speeds in any one setting.

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**AUTOMATICS**

# TOOTH SPACING VS CONCENTRICITY

## In Gears

By MAHLON H. MATCHETT  
Le Maire Tool & Manufacturing Co.  
Dearborn, Michigan

**C**ONCERNING the manufacture and use of gears, the writer herein wishes to set forth the actual conditions as they exist, and incidentally,

correct some of the false understandings that appear to be impressed on the minds of a large proportion of those people who have to do with the manufacture of gears.

First of all, without going back into ancient history, let us start with an understanding of what a modern gear is.

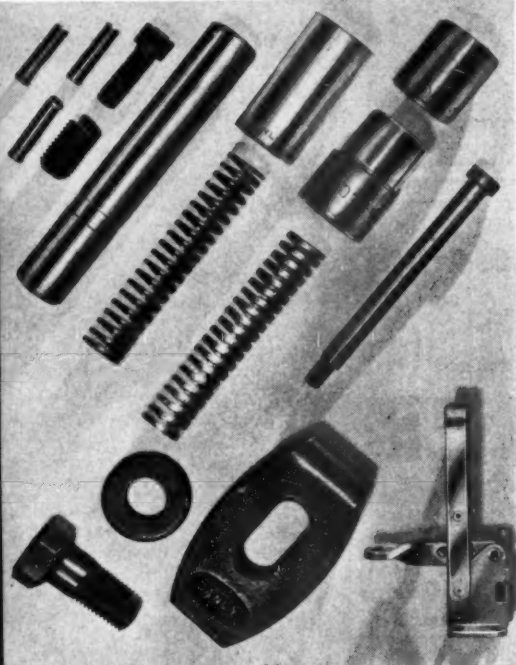
Gears are mechanical means used to transmit rotary motion from one axis to another, in many thousands of different applications. If it were possible to maintain sufficient friction between smooth surfaces, it would only be necessary to use round discs to effect the desired result, but owing to the fact that frictional contact is not practical, it is therefore necessary that some form of "Toothed-and-notched", circularly formed devices be used to overcome the element of slippage; hence the gear.

## PRECISION

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**Concerning the controversial  
question of how to measure  
variations in tooth position.**

The most practical, and naturally the most commonly used form of same, is the *involute* gear, deriving its name from the fact that the working surfaces or sides of the teeth are of involute form. It is not necessary, at this time, to go into the mathematical explanation of the involute form, other than to say that an involute is nothing more or less than a portion of a "constant-rise cam". Therefore, a gear with 30 involute teeth is nothing more nor less than a circular arrangement of 30 equally spaced involute forms or constant-rise cams, which are really the one side of 30 gear teeth. The opposite sides of the same 30 gear teeth are also 30 similar involutes, arranged in the same manner, only reversed, the material between any pair of these opposed involutes being the gear tooth.

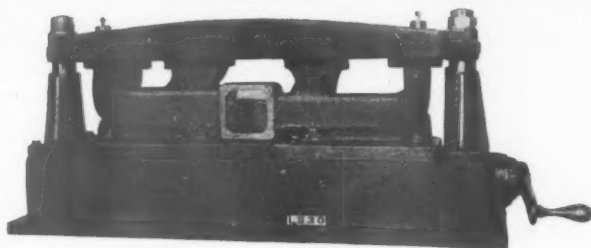
For purposes of calculation only, an imaginary diameter, known as the pitch diameter, and representing the diametral surface of a corresponding smooth disc, (as spoken of above), is used for establishing the spacing of the involutes in such a manner as will permit of the teeth of a mating gear to be engaged therewith.

Now that we have discussed what really constitutes the working surfaces of a gear tooth, we might mention that the linear measurement from some point on one tooth to the same point on the next, measured on the pitch circle is known

(Continued on following page)



# A CAPITAL INVESTMENT

**PROPOSAL L-830**

Drilling flange holes in automobile motor manifold. The lower adapter is designed to support the four flanges and automatically compensate for the variations in castings. A Swartz lock holds the clamping action. The standard jig can be used again as tooling becomes obsolete.

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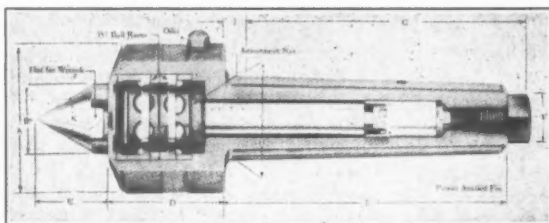
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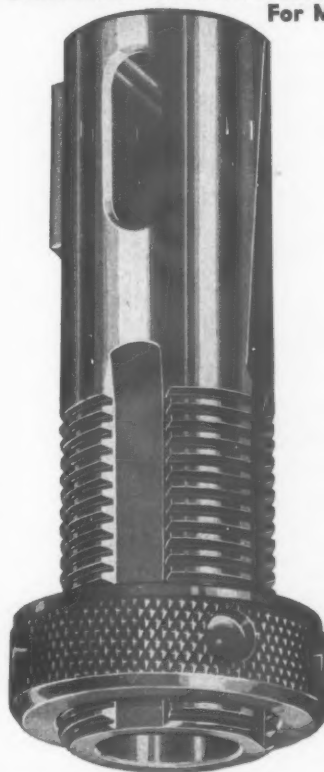


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## TOOTH SPACING

(Continued from preceding page)

as the "circular pitch", and in order to permit of engagement with a mating gear, (as referred to in the preceding paragraph), we must provide spaces between the teeth that will accommodate the teeth of the mating gear in engagement.

In view of this fact, it is the customary practice to make the gear tooth and the space between the teeth each approximately one half of the circular pitch, the space being a few thousandths of an inch

wider than the tooth, to take care of various imperfections encountered in the manufacture of gears. This amount of difference between the width of the tooth and the space is called "back-lash", and may be varied as desired, or required.

When a pair of mating gears are mounted in working position so that one transmits rotary motion to the other, it is safe to say that 99.9% of all applications are designed to have more or less back-lash, therefore, it is quite obvious that only one side of the teeth of any gear are being used at a time, because the driving sides of the teeth of the driving gear are contacting or pushing against the opposing or driven sides of

the teeth of the driven gear, while between the other sides of the mating gear teeth there exists this small amount of clearance or back-lash, as mentioned above.

By the statement above, we wish to convey to the reader that for a pair of mating gears to deliver pure constant-velocity rotary action, it is absolutely essential that the teeth be positioned around the circumference in such manner that each and every tooth is within very close limits of being in their true circumferential position according to complete circumference of the gear.

It has been inferred by a few people that it is only necessary to hold close limits on the tooth-spacing merely as measured from any one tooth to the next, but with this the writer cannot agree, because this small "tooth-to-tooth" tolerance may accumulate or "pile up" into a sizeable amount in traveling approximately half way around the gear so that it is unfortunately probable in many instances to find gears whereon some teeth are extremely out of position.

Let us take, for example, a 30 tooth gear, that has an established limit of plus or minus .0004" (four tenths) for tooth-to-tooth spacing. It is possible, and in many cases it does happen, that this .0004" limit may read consistently plus, for a distance approximately half way around the gear, so that in traveling from No. 1 tooth to No. 15 tooth, this small amount has accumulated to 15 times .0004" or .006 (six thousandths), meaning that No. 15 tooth is .006" out of position with relation to the starting position.

Now, if such a gear were used, it can be readily seen that it will transmit to its mating gear an alternately accelerated and decelerated, or galloping rotary motion, of .006" in every revolution which, when rotated at say 2000 to 3000 R.P.M., presents a very unsatisfactory performance.

The writer in no way means to minimize the importance of tooth-to-tooth spacing, but instead wishes to emphasize the point that entire circumferential spacing is actually much more important in the making of really good gears.

Errors in tooth-to-tooth spacing, in many instances, may be somewhat improved by proper lapping, but lapping has no appreciable corrective effect on circumferential spacing.

The sole purpose of the statements is to point out the facts that it is the sides of a gear tooth only, and only one side at a time that performs the work, therefore, it is of greatest importance that the working sides of all teeth come up their respective working positions in true circumferential sequence with relation to the rotation of the axis.

It appears that the inspection of this important feature in gears, in most shops,

(Continued on following page)

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3

### Modern Horizontal Grinders!

FOR over 30 years, Horizontal Disc Grinding has been acknowledged as the ideal method for quickly generating a good, flat surface upon a wide variety of parts, large and small.

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BELOW: Variety of gear cases, covers, plates and brackets cleaned up on this 53" Gardner Horizontal Grinder at rates ranging from 30 per hour on the largest-area parts, to 90 per hour on the small pieces.

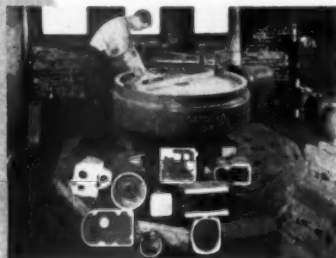


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You also get the most modern design and construction in Gardner Horizontal Grinders. Three sizes — 30", 53" and 72" units — are available in V-belt drive. Each carries new style louver-type guard ring, and swinging bar-type dresser.

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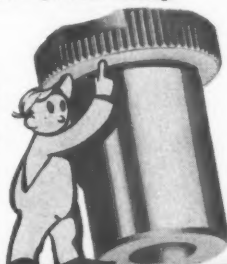
**BLACK DOME** improves appearance, resists rust.

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**NICKLE STEEL LOCK SCREWS** provide extra strength.

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- making your estimates profitable to you
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- developing new production tools and processes
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- organizing new methods of handling materials

and in many other ways give you the kind of help you need **RIGHT NOW** that will enable you to operate most efficiently and profitably in the present emergency.

**Your production will "carry on" as efficiently as your plans will provide at the beginning. There's no obligation to have our engineers discuss your problems with you.**

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## TOOTH SPACING

(Continued from preceding page)

is being drastically neglected or disregarded, and that instead, the manufacturer is depending for a large part on an inspection of concentricity to determine between so-called "good" and "bad" gears. This circumstance may be partially due to the facts that it is one of the easiest and fastest of inspection operations, and that it has been a "pet" procedure for many years.

Although this concentricity inspection may have some small value, it by no

means should be used as a deciding factor in accepting or rejecting gears, as it is just as liable to accept bad gears and reject good gears, as vice versa, with relation to circumferential spacing.

Excepting for some negligible few applications, such as slow-moving indexing devices and the like, there are no instances wherein gears are designed to roll with metal to metal contact on both sides of the teeth at the same time, nor is there any automobile, machine tool, or industrial application wherein power is transmitted in the direction of a line passing through the two axes of a pair of mating gears, therefore, any inspection

for concentricity made by rolling a gear in contact with a master gear tied on an indicator must be of little or no consequence in determining whether it is good or bad.

We realize that the gear manufacturer cannot make thousands of gears day in and day out and have them all come within close limits for circumferential spacing, but it is possible to set up an inspection of this particular function, and take steps to control it within closer limits than it has been in the past.

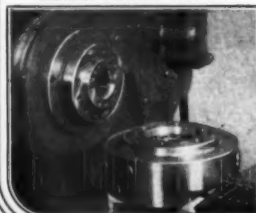
Further, it is impossible to move the teeth after the gear has been cut and hardened, to bring them into proper spacing, but it is possible to hold the gear in such position while finishing the bore, so that these errors in circumferential space are materially compensated for, although the concentricity reading of the gear may be somewhat affected.

In summarizing, the purpose of this discussion has been to bring to light the real importance of circumferential tooth-spacing around the entire gear, as compared to tooth-spacing merely measured comparatively from one tooth to the next, and also, to show that accurate circumferential tooth-spacing should be maintained even to the point of sacrificing so-called concentricity, if necessary.

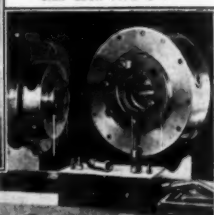


## HOW TO AVOID DELAYED DELIVERIES ON CHUCKS FOR THE NEW TYPE SPINDLES

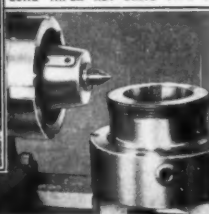
AMERICAN STANDARD TYPE A-1



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Cushman is better equipped and is turning out more chucks today than at any previous time in its history. We have been able to give the great majority of our customers normal fast service despite abnormal conditions.

But it is manifestly impossible and, in fact, not desirable at this time to maintain the tremendous standing stocks that would be necessary to supply all needed chuck types in each of the three new type spindle noses illustrated on this page.

We therefore suggest that you place your order for chucks for the Type A-1, Type D-1 and type E Spindles at the time you place your order for the lathes. In this way we can give you every reasonable assurance that the chucking equipment will be ready for delivery at

the time you receive the machines. This may seem like an unimportant detail, but it is attention to just such details that will save precious time in national defense work.

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# CUSHMAN CHUCKS

A WORLD STANDARD FOR PRECISION

## Shells Roughed Out 19 Times Faster Today

Seventy-five millimeter shells are being roughed out nineteen times faster today than they were during the last war, Fred C. Dull, vice president of the Monarch Machine Tool Co., Sidney, Ohio, told a group of engineers of the International Business Machines Corp. at Endicott, N. Y. recently.

During the last war it took 12 minutes to rough out a 75 m.m. shell, he said. Today the same job is being done in 38 seconds.

Showing how engineering development of machine tools has tremendously speeded up production of defense equipment, Dull said that gears used in defense equipment which were ground at the rate of three pieces per hour in the last war, are now being shaved at the rate of nearly one a minute, and that deep-hole drilling in solid metal which formerly required four hours, is now being done in 15 minutes.

"The machine tool industry has just one big job before it today," Dull said, "and that job is equipping the manufacturers of this country for the production of national defense equipment. All other considerations have long since gone by the boards. Ours is a key industry in national defense—and we are going to fulfill our responsibility."



# DEFENSE MATERIALS FINISHED FASTER

WITH NEW LOW-COST

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**TOOLS**  
by  
**TECO**

**Y**ou can speed delivery of almost any machinable material demanded for National defense, with TECO Cutting Tools of new low-cost carbide.

Progressive machine shops report production increases of 75% and more since TECO has been specified. A super high speed tool, TECO does the machining job 4 to 11 times faster than high speed steel. And not only steps up output of present equipment, but cuts fabricating costs all down the line.

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ADVANTAGES:

- Machines steel hardened up to 550 Brinell.
- Machines steel 4 to 11 times faster than high speed steel and with amazingly little tool wear.
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- Reduces floor-to-floor time as much as 30%.
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- Gives 10 to 50 times as many pieces per grind.

For faster deliveries on your machining jobs, for lower production costs, and extra dividends on Defense orders, specify **TECO**—the carbide cutting tool for modern high-speed, low cost machining.

There is a standard grade of **TECO METAL** to meet your requirements. Send today for our Tungsten Electric representative. Let us prove to you **TECO METAL'S** many cost-cutting advantages. For information concerning special applications and specific recommendations, address

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**TECO CARBIDE TOOLS** *pay dividends*

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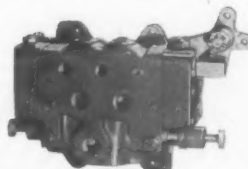
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#### OILGEAR VALVES

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# New Literature

## Of Interest to the Tool Engineer

### (127) Bore Gages

*New Speed with Accuracy in Bore Checking.* 4 pp. Standard Gage Company, Inc., 80 Parker Avenue, Poughkeepsie, N. Y. A timely bulletin on the improved Dial Bore Gages, illustrated with pictures taken at the Pratt & Whitney Aircraft plant.

### (128) Cut-Off Wheels

*Norton Cut-Off Wheels.* 32 pp. Norton Company, Worcester, Mass. Well illustrated, this booklet recounts the progress which has been made in abrasive cut-off wheels, and describes present wheels and their operation.

### (129) Steel Handbook

*Handbook of Special Steels.* 124 pp. Allegheny Ludlum Steel Corp., Tool Steel Division, Watervliet, N. Y. Information on the properties, uses, and fabricators of Allegheny Ludlum steels which should be helpful in the selection of the proper types.



### (130) Lathe Catalog

*South Bend Lathes Catalog 100A.* 104 pp. South Bend Lathe Works, 928 E. Madison Street, South Bend, Ind. This is said to be one of the most complete general lathe catalogs ever published. Containing over 240 illustrations, it shows 50 different sizes and types of South Bend Back-Geared, Screw Cutting Lathes for manufacturing, tool room, and general shop work. A copy will be mailed on request to any firm or individual who mentions THE TOOL ENGINEER.

### HOW TO ORDER

Booklets listed in these pages or information on new equipment may be obtained by using the post card bound in this issue. Merely fill out one coupon for each item desired, being sure to print plainly and to include position and company. Mail the card to us and you will receive the information desired at once.

### (131) Machine Tools

*Six New Folders.* Pratt & Whitney Division Niles - Bement - Pond Company, West Hartford, Conn. Please Note subsidiary key number for each folder:

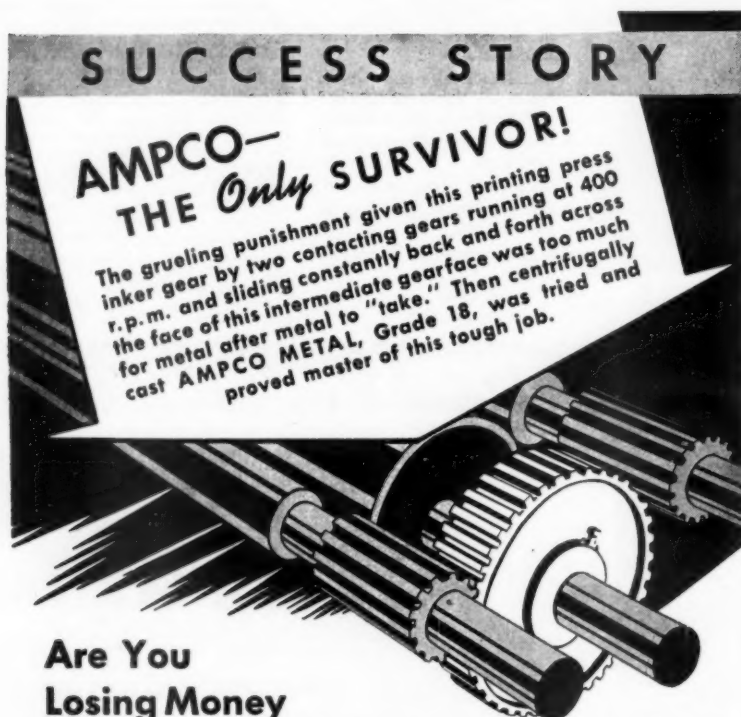
- (131-a) *Deep Hole Drill Sharpener.* 4 pp.
- (131-b) *No. 1/2B - No. 1B Deep Hole Drillers.* 2 pp.
- (131-c) *No. 1 1/2 Deep Hole Driller.* 4 pp.
- (131-d) *No. 1/2B - No. 1B Deep Hole Reamers.* 2 pp.
- (131-e) *Gun Barrel Chambering Machine No. 1/2B.* 4 pp.
- (131-f) *Gun Barrel Rifling Machines No. 1/2B - No. 1B.* 4 pp.

Each circular is of suitable size to fit ring binder, and each contains illustrations, description, and specifications.

### (132) Tool Steels

*Crucible News, Winter 1940.* 32 pp. Crucible Steel Company of America, 405 Lexington Ave., New York. This issue contains interesting stories on the appli-

(Continued on following page)

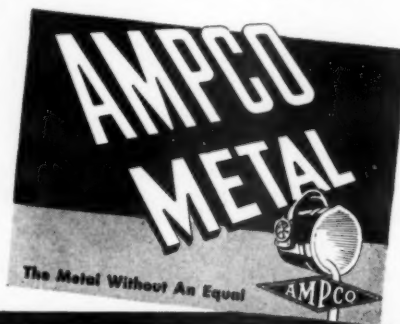


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If there are metal parts in either your product or production tools that "can't take it"—and are slowing up production or creating customer ill will — try AMPCO METAL. It has a unique reputation for doing a job after all other metals have failed. It's exceptional in its strength and resistance to wear, fatigue, impact and corrosion. Available in many grades of hardnesses and physical properties. Write for data sheets.

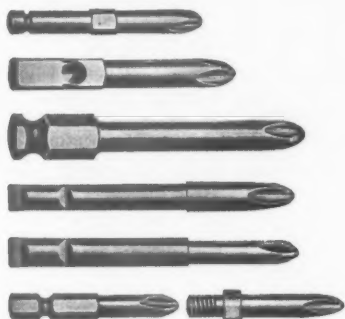
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Dept. TE-2,  
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# When you have a screw driving job APEX has a POWER BIT for it

PHILLIPS SCREWS • SLOTTED HEAD SCREWS • CLUTCH HEAD SCREWS



## For Phillips Screws

Four sizes of APEX-Phillips Power Bits drive the entire range of Phillips wood screws, machine screws, sheet metal screws and stove bolts. They are available for nearly all makes of electric, air and spiral drivers, in two grades—General Purpose for the standard screw, and Super Service for case-hardened, self-tapping screws.

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APEX Power Bits for slotted screws fit the four types of heads commonly used—round, flat, oval and binding. For certain operations where the standard Bit cannot be used, special Bits are furnished to fit the job. APEX Power Bits are available for all popular electric, air and spiral drivers, in the two grades.

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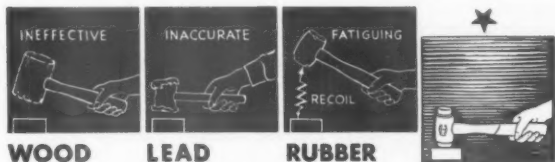
APEX Power Bits for clutch head screws are now available for many makes of electric, air and spiral drivers. Send us the type and size of power tool used for detailed information and prices.

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metal heads have edges that turn, break and fly off.

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heads and faces stay accurate, absorb shock and wear longest.

★ Chicago Rawhide Hammers and Mallets are the tools for striking hard accurate blows safely on any surface that must not be cracked, battered or marred. The tough Java Water Buffalo hide, coiled, compressed and treated for long life will not split, break or even dent, and has resilience to absorb rebound for easier, accurate blows.



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Precision work on many special sizes of bushings and other hardened and ground parts.

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## NEW LITERATURE

(Continued from preceding page)

cations and use of Tool, Alloy, Stainless and other Specialty Steels.

### (133) Cutting Tools

*Instructions for Using Carbide Standard Tools.* 12 pp. Carbide Company, Inc., 11145 E. 8 Mile Blvd., Detroit, Mich. A pocket size manual of instructions for using the new Carbide Standard Tool line.

### (134) Machining

*Ampco Metal Machining Information.* Engineering Data Sheets 47 & 48. 4 pp.

Ampco Metal, Inc., Dept. TE-2, Milwaukee, Wis. Information showing correct methods for drilling, reaming, tapping, milling, and grinding this aluminum bronze alloy.

### (135) Gear Booklet

*Bulletin Number 270.* 44 pp. Michigan Tool Company, 7171 E. McNichols, Detroit. A wide variety of tables and formulae, with actual examples for calculation illustrating new methods. Of value to the shop executive and engineer.

### (136) Sheet Metal

*Niagara Machines & Tools for Sheet Metal Shops.* 24 pp. Niagara Machine

and Tool Works, 637-97 Northland Avenue, Buffalo, N. Y. A handy, pocket-size catalogue.

### (137) Hydraulic Cylinders

*Tomkins-Johnson Hydraulic Cylinders.* 24 pp. The Tomkins-Johnson Co., 624 N. Mechanic Street, Jackson, Michigan. This catalog is said to include information on the Hydraulic Cylinders which has not previously been included in books of this kind.

### (138) Live Centers

*The Sturdimatic Live Center.* 4 pp. Sturdimatic Tool Company, 5218 Third Avenue, Detroit. Illustrations, sketches, description, prices of this heavy duty live center.

### (139) Hydraulic Equipment

*Barnes Power & Control Panel and Barnes Index Power and Control Panel.* 2 pp. each. John S. Barnes Corporation, Rockford, Ill. These pamphlets are the latest two of a series which will give data on the design and application of Barnes products.

### (140) Speed Control

*How to Speed Up Production with Variable Speed Control.* 24 pp. Reeves Pulley Company, Columbus, Ind. This booklet cites 36 specific examples in all types of industrial plants in which speed control made possible definite production increases and advantages. *Reeves Speed Control for Machine Tools.* 8 pp. Explanation of the various types of units and typical installations.

### (141) Electric Tools

*Portable Electric Tools.* 1941 Catalogue. 60 pp. Black & Decker Mfg. Company, Towson, Md. Fully illustrates and describes the complete line of 132 portable electric tools, many of which are said to be entirely new.

### (142) Ball Bearings

*Sealmaster Ball Bearing Catalogue No. 840.* 32 pp. Stephens-Adamson Manufacturing Company, Aurora, Ill. A well organized presentation of data on the Sealmaster bearing line.

### (143) Slide Rules

*How to Choose a Slide Rule* by Don Herold. 24 pp. Keuffel & Esser Co., Hoboken, N. J. Although intended for engineering college students, this booklet will be of value to anyone who uses a slide rule—not only for the information included but for the writing of Don Herold.

### (144) Electric Tools

*It Sands, Saws, Hones, Files.* 4 pp. H and H Research Co., 12540 12th Street, Detroit. Description of two Junior and four Senior models of reciprocating Multi-purpose tools.

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"THAT'S EASY BILL—WE'LL USE THOSE NEW BOICE-CRANE METAL CUTTING BAND SAWS AND DRILL PRESSES. WE CAN GET THEM QUICK TOO!"



Boice-Crane tools break up "bottlenecks"—and you can get them NOW! They get jobs out quick, fast and economically in production, tool room, experimental departments.

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Saws nearly everything—wood, sheets, rod, tube, brass and aluminum casting gates. The perfect small machine for production, tool and die shops, experimental work. Built like expensive machines. 8 speeds from 75 to 2,200 f.p.m. Powerful V-belt drive through gear box. One-piece welded steel frame. Extra large trunnions hold table true for heavy jobs. New type guides for split-hair contour work.

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FLUTED TAPER PIN REAMERS

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Holding Washers  
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FEBRUARY, 1941

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## Handy Andy Says—

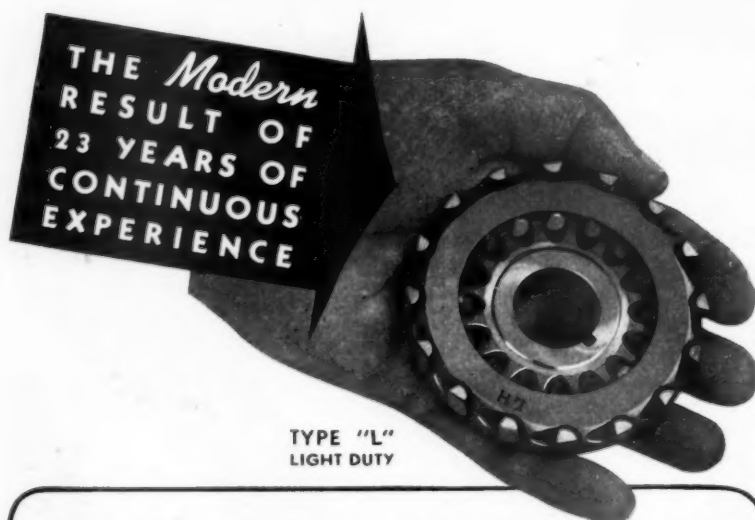


**B**ELATEDLY, I want to congratulate the author of the fine editorial—"America in the Making"—in the December **TOOL ENGINEER**. I should have done that in the previous issue, but it happened that I had actually mailed in copy

for January before the December number came to hand. Anyway, the author is to be commended for a fine piece of promotional writing; it is an inspiration to the engineers "who tool the nation". And it is true, as the editorial implies, that the engineers and scientists of America (of the world, for that matter) are crashing new industrial frontiers, and that as a result of this and the genius of Tool Engineers in tooling for mass manufacture, we enjoy an unprecedented material progress.

One can also agree with the implications of the editorial, (but with reservations) that the whole bears the stamp of

youth and youthful enthusiasm; that what we have is the result of projecting ahead, not looking backward. But what, in the final analysis, is youth, except a matter of mind? Youth, without experience, blunders to an end, achieves success on the debris of mistakes. The oldster, possessed of unlimited experience, may stay in a rut for life unless endowed with enthusiasm, the youthful outlook. But, the man of matured years, endowed with inventive genius, enthusiasm and experience—ah, there is the wide horizon! It is a combination of these qualities, with vision and faith, that enabled the founders of the A. S. T. E. (men somewhat greying at the temples by now) to project this Society to a dynamic force in the industrial and engineering world.



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Continuously for 23 years, the LOVEJOY TOOL CO. has been manufacturing dependable **POSITIVE-LOCKED INSERTED BLADE** type milling cutters for many of the best known manufacturers in the country. And a majority of our original customers are still on our books!

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**LOVEJOY**  
**TOOL CO., Inc.**

**SPRINGFIELD, VERMONT**



Despite all of our material progress, however, I wonder if we are not wavering on the brink of a social and economic recession, to use that term? For certainly, at no time in American history, have our social and economic systems been so sharply challenged as at the present time. Of late, we have been subjected to the impingement of foreign Isms, with their undeniable impress on the consciousness of the masses; we have been made the guinea pigs in a series of social and economic experiments which, in the guise of reform, have nevertheless weakened our national fibre. And, living in a synthetic age, we have been so weaned from the rough if substantial fare of our fathers that we have had to be pepped up with artificial hormones and vitamins. We are getting away from fundamentals. Perhaps, now, we need a national crisis to jolt us back into a sense of values, may even need the crucible of war to eliminate the dross. For certainly the basic elements that, combined, fused America into a great and progressive nation are still there. And it is those basic elements that we want to preserve.

Now, I am not one to pine for the "good old days", old to the youngster who never had to hand crank a recalcitrant engine but fresh in the mind of my contemporaries who hailed the first self-starter. And that wasn't so long ago—in fact, the inventor is still "there" and just young enough to keep on improving our design for living. Those of us who lived in those recent "old days" didn't like them so well, and we did our damndest to change them. Perhaps we effected change too fast; who knows? But consider that in the brief span of our time there has been effected changes in the habits and living standards of the masses that are truly revolutionary in their scope. When we came on the scene, the telephone and the talking machine were still modern wonders, if crude. We have witnessed the evolution

(Continued on following page)

# MARVEL SAWS

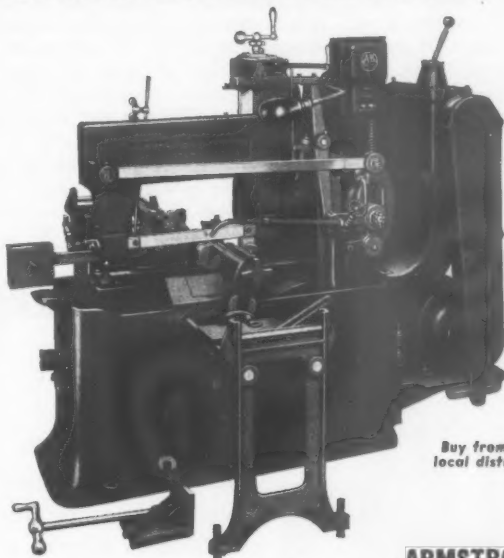
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**F**OR automatic high speed production of identical lengths cut from bars, MARVEL 6A and 9A heavy duty, all-ball-bearing saws are unequalled. They will cut-off more pieces per hour (from long rifle barrels to thin gear blanks) and will produce them at lower cost than by any other method. Built for speeds, feeds and blade tensions impractical for other saws and equipped with an automatic bar push-up, they require no more attention than an automatic screw machine—will continue to cut-off identical pieces automatically until stock is exhausted or until automatic stop trips at the predetermined point. Operate to close tolerances.

Also serve as fast, efficient, general purpose saws. Bar push-up can be disengaged at any point, miscellaneous cuts made, and production work resumed by disengaging and re-engaging push-up.

Write for Bulletin



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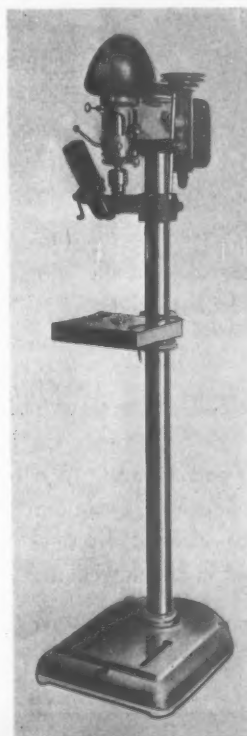
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FEBRUARY, 1941



## NEW! CENTER GRINDER and DRILL PRESS

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**\$197<sup>50</sup>** Standard grinder, 40" between centers, complete with 110-220 volt motor.

F.O.B. Detroit  
Write for Bulletin No. 11

**DALZEN MANUFACTURING CO.**

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## HANDY ANDY SAYS

(Continued from preceding page)

of the horseless carriage, wireless and flight, and we have helped to streamline them, to tool them for mass manufacture, even as we now tool the machinery of defense. Oh yes, we're smart, very smart, in the engineering of material things. But so far, we have failed in human engineering, and the sooner we turn our thoughts to this chore the better for the future of America. For, of two forces of discontent—the constructive and the destructive—it is better that the first prevail. Needless

to say, Tool Engineers stand for construction.

Now, I am not against reform, but I would see reform based on a workable premise. The combination of high wages and short hours is a sane and progressive reform, because it presumes economic independence and the leisure in which to enjoy it. This, of course, is contrary to the preachments of the mossbacks of yesterday, who held that any shortening of the (then) 14 hour day would be "bad for the morals of the working class". Bunk! The greatest immorality of all is the bondage engendered of apathy and

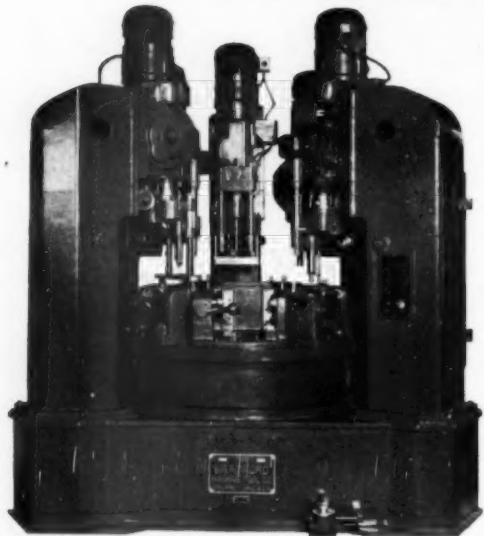
misery, because it stifles mass progress. But, in subscribing to collectivism, the masses have put themselves in a bondage just as onerous, because now we have a deadly levelling, and, practically, a legislated class division which is just as baneful as the slavery prior to '61. The difference is that then the slave could buy himself free, now the freeman buys himself into bondage. And that's about the same kind of progress that Old "Muss" is having in Greece and Africa.

We hear, from the wiseacres, that America must eventually succumb to collectivism if we are to compete in the economic scheme now being set up by the dictators of Europe. Even England, these brain trusters say, cannot escape a social and economic revolution; the day of wealth and aristocracy is gone and from now on labor will sit in the saddle. Well, I'm not adverse to that, provided that labor first learns to control itself and is not controlled by racketeers. And fortunately, there is a marked trend toward conservatism. Yet it is significant (I repeat myself here, to stress a point) that not one labor government in Europe has been able to stand up under the assaults of the authoritarians, that even England was imperilled by its own labor until labor and the conservatives learned to pull together. And there is no direct evidence, as yet, that labor reforms in America have effected the major benefit promised, which was to spread employment and decrease relief. True, there is increased employment now, but that is due to national emergency, not to planned reform.

As for hormones and vitamins, I'm for them. Living in an artificial age, one must resort to artificiality to be natural. Now, now, Bre'r A. S. T. Eer, I know just what you're thinking—I can read your mind like an open book. But we'll save that for the big meeting in March, when the boys who "tooled the nation" will meet, greet, eat and (maybe) treat at the big Tool Show the Society is about to spring on an expectant technical world. So, I'll be seeing you then, hoping that Slim McClellan will have his Hounds baying and that Connie Hersam will have Rally Sand or some other artiste on tap for the Scotties. So, stock up on hormones to pep up your dogs, because there's going to be plenty of tired ones before the Show ends. It's headline stuff, you know.

Yours for Tool Progress,  
Handy Andy.

## HAVE YOU A "TOUGH NUT" TO CRACK In Boring, Drilling or Tapping?



**BRADFORD Unit-Type Self-Contained  
Single or Multiple Heads**

★ Right now, you may have a "tough nut" to crack on some difficult drilling or tapping problem. If it's "different"—or, if it's costing too much money by present methods—or, as we are quite sure, you've just got to step up production—we have had plenty of experience in cracking such tough nuts.

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creasing capacities. Give us a call—or send us a blueprint of that tough job to be drilled, tapped. We'll estimate on a better, faster way through the Bradford Unit-Type Heads. We have designed many special heads for unusual applications, there are several "standard types" to choose from—single or multiple spindle. Get in touch with us.

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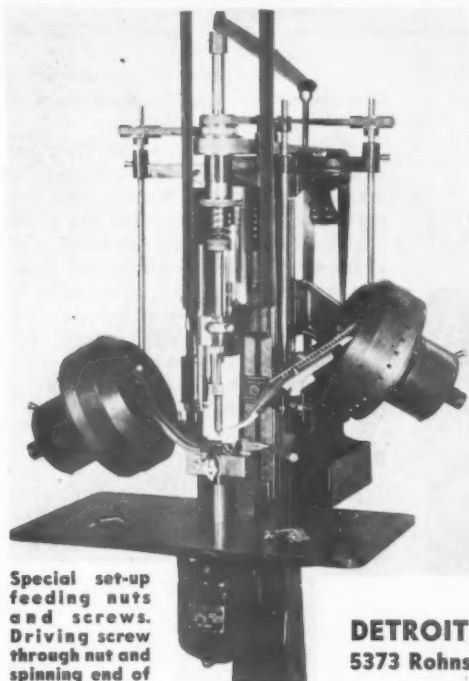
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## Increase Production

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Special set-up feeding nuts and screws. Driving screw through nut and spinning end of screw.

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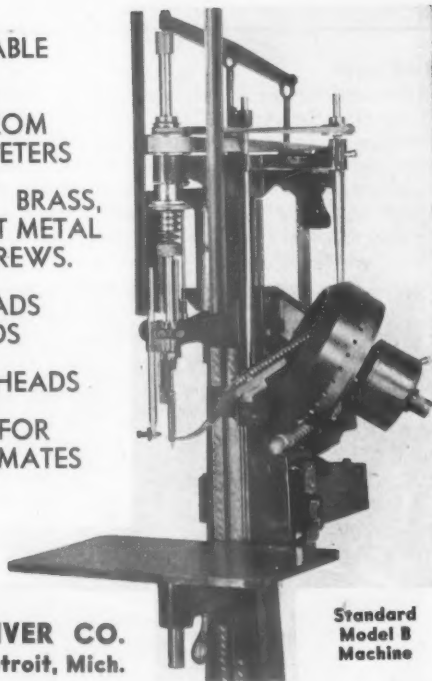
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The easiest way to speed-up output on lathes, planers, slotters and shapers is to take the correct ARMSTRONG TOOL HOLDER for the operation at hand, with a cutter anyone can grind, from a stock shape of high speed steel and speed up the machine tool to capacity.

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## CERROMATRIX pulls many a die maker out of the hole

In these days of tremendously expanding production, the tool and die shop is the key to the whole situation. Time and again over-worked die shops have been able to make the work flow at a faster clip by taking advantage of the speed-up possibilities of CERROMATRIX. This low-temperature-melting alloy saves from a few hours to many days on all kinds of die-making jobs small or big. Melts at 250°F. **Expands slightly on solidification.** Tensile strength 13,000 lbs. per sq. in. Brinell hardness 19. Used by many of the largest metal-working plants in the country for locating and securing punch and die parts, stationary machine parts, etc., permanently in position.



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# » » A. S. T. E. DOINGS « «

By IRWIN F. HOLLAND

## Baltimore

The first meeting of 1941 was held on Wednesday, January 8. There were approximately 75 members at the dinner and meeting. Our friends from Washington were again present. At the short business meeting a committee for the election of the 1941 officers was selected.

At the next meeting in February the new officers will be elected. The speaker for the evening was Mr. Malcolm F. Judkins, chief engineer for the Firthite Division; Firth-Sterling Steel Co., who gave a talk on "Sintered Carbide Tipped Tools and Their Application to Metal Cutting." Mr. Judkins illustrated his fine talk with

a movie showing the various phases of manufacture and applications of the tools to the metal cutting industry.

The chapter is going to vote on a new meeting place for the fall sessions—The Engineers Club of Baltimore. This is a very professional club which has a fine dining room, game rooms and a good library with all the latest technical books and data. All this will be available to Chapter No. 13 if the motion is swung in favor of the new meeting place. The Chapter wishes to extend to all the other chapters its sincerest wishes for a very happy and prosperous new year.

## Boston

The January meeting of the Boston Chapter was a splendid success in spite of the fact that a goodly number of our regular members were laid up with attacks of gripe. Seventy-one members and guests attended the dinner and 120 were in attendance at the technical session at Massachusetts Institute of Technology.

The meeting was turned over to "Locky" Lockwood our Vice Chairman who introduced Mr. Joseph H. Pasell, Design Engineer of Morse Twist Drill & Machine Co. (charter member of the Boston Chapter) who presented a talk on the subject of "Government in the Bee-hive." Mr. Pasell's talk was splendidly delivered and convinced each of us that Bees are adepts in the finer arts of engineering.

Our guest speaker for the evening needed no introduction but Mr. Lockwood in his customary polite manner called upon our Chapter Member and Chairman of the Standards Committee, Mr. Anthony J. Snyder, Director Physical Laboratory, Morse Twist Drill and Machine Company. His subject was "The Proper Selection and Use of Tools". With the aid of a Delineascope, Mr. Snyder projected drills, taps, and cutters on the screen and gave recommendations for their proper use.

Mr. Snyder's comments on each tool as shown with the aid of the Delineascope proved of interest and value to all present. A rising vote of thanks was tendered to both Mr. Snyder and to Mr. Pasell and the meeting adjourned at 10:15 P. M.

## Buffalo-Niagara Frontier

The Buffalo-Niagara Chapter held its meeting on December 19. Mr. O. W. Winter read an article from the Buffalo Evening News about the training of engi-

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N. W., Atlanta—2645 Santa Fe Ave., Los Angeles—2645  
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aine Avenue, Toronto.

neers for the Defense Program. It was also announced that an Emergency Defense Committee would be formed.

Mr. Crofoot then introduced the speakers for the evening. The first was Mr. H. T. O'Connor from the Federal Bureau of Investigation. The second speaker on the program was Mr. J. Armour from the U. S. Tool Co. Mr. Armour showed movies and gave a talk on U. S. Multi Millers and Multi Slide machines.

### California

California held a closed but well attended meeting at Scully's Cafe on January 9 for the nomination of officers for the coming year.

An exceptionally interesting talk on recent developments in Gear Shaving was given by R. S. Drummond, President of the National Broach & Machine Co., Detroit. Questions and answers prolonged the meeting to a late hour necessitating the postponement of other scheduled matters.

Election of officers will take place on February 13 following the dinner at the usual meeting place. A tool quiz program will be presented by H. F. Lenz of the National Postal Meter Co. This feature, it is hoped, will invoke discussion by the more timid members who are hesitant in expressing their views. It is one of the purposes of our organization to gather and condense this mass of tucked-away information so that industry as well as our members will be able to contribute more to our national defense program.

### Cincinnati

The Cincinnati Chapter held its December meeting at the Ohio Mechanics Institute on Tuesday evening, December 10.

After the regular business meeting we were fortunate in having Dr. Ernest J. Abbott, of the Physicists Research Co., deliver a talk entitled, "Surface Finish and the Profilometer", illustrated with lantern slides and a demonstration of the Profilometer.

In the past few years a great deal of interest has been directed to the relation of surface roughness, to the fit, wear, and lubrication of many machine parts. The dimensions of the surface irregularities which determine the roughness are amazingly small on many practical surfaces, the heights of these irregularities are only a few millionths of an inch.

Mr. Abbott pointed out that in modern industry many such problems which involve quantities which are too small or too rapid to measure by ordinary methods, and these problems can often be solved by the application of electron tubes and other modern physics tools. Among the developments of Mr. Abbott's organization is the Profilometer, an instrument for measuring surface roughness.

*(Continued on following page)*



## PRECISION FOR DEFENSE

Thousands of separate parts go into a modern fighting plane. And these parts have to be accurately manufactured to within extremely close limits. Because this calls for Precision Tools of the most extreme accuracy, Lufkin is already playing a prominent part in America's Defense Program.

But there is nothing new about the enormous demand for Lufkin products. For fifty years leading American machinists, engineers, mechanics and contractors have looked to Lufkin for easy-to-read, easy-to-handle, accurate measuring devices. If you have need for the best Precision Tools, Tapes or Rules, it will pay you to specify Lufkin.

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## A. S. T. E. DOINGS

(Continued from preceding page)

### Cleveland

Playing host to 135 members and guests of the Cleveland Chapter on Friday, January 10, the Weatherhead Company literally "stuffed" them with a delicious turkey dinner.

After the banquet, the members were conducted in groups of ten by competent guides on a tour through the plant. There they saw the raw material as it came from the supplier and passed through the various manufacturing processes until it emerged as a finished product.

When the last group had finished their plant inspection, the members gathered in the spacious cafeteria to hear an address by Lieutenant Dennis of the United States Army Ordnance Department. Lieutenant Dennis provided the members with a brief description as to how the Ordnance Department operates, its function in war time, how the Government cooperates with private industry, and what the Government is doing at present to relieve "bottle-necks" in the production of vital defense material.

This enlightening talk gave the listener a better insight concerning the methods by which the Government seeks to build

up large reserves of necessary war materials until private industry is able to step into the picture and fill the gap.

After the festivities, Mr. C. V. Briner, the Chapter Chairman, cordially thanked the Weatherhead Company for the splendid hospitality extended the ASTE members.

### Dayton

The Dayton Chapter held its January meeting at the Gibbons Hotel, Monday, January 13, with an exceptionally fine turnout of members and guests.

After partaking of a fine duck dinner the nominating committee was elected to nominate the officers for the coming year. This committee consisted of Messrs. Ziegler, Matthews, and Blair. The meeting was then turned over to the Meeting Chairman, Whitey Pook who introduced a number of new members, and then introduced Mr. Cheever Ely, local representative of the Norton Company, Mr. Fred Hayes, District Manager, Mr. Strong, and Mr. V. H. Ericson, all of the Norton Company of Worcester.

Mr. Ericson, the principal speaker of the evening presented an exceptionally fine and interesting talk on the ultra-finishing of small tools with fine grit wheels. He also showed two separate movies illustrating the manufacture of abrasive wheels and the grinding of various machine tool parts. Slides were then shown by Mr. Ericson of the grinding of different types of cutters, first with the coarser or standard grades of grinding wheels in conventional use and then showed the same cutters after they had been ultra-finished using very fine wheels, removing approximately .001" per pass. The slides were well received as they showed the remarkable finish obtainable with fine grit wheels and proved beyond a questionable doubt that the life of a cutter sharpened in this manner would be much longer than cutters sharpened with the conventional coarser grain wheels. We certainly believe that other Chapters would be interested in hearing Mr. Ericson and seeing these pictures as everyone was given plenty of food for thought on the grinding of tools and cutters.

### Detroit

Number One packed 'em tight at the January 16th dinner meeting, when Detroit Transmission Division of General Motors sponsored a talk on the "Hydro-matic Transmission". W. L. Carnegie and O. K. Kelley, respectively, did the speaking, the first giving a history of the job and the latter giving the slide talk. The job was quite thoroughly handled, and truly, it can be said that it was one of the most intensive and purely technical sessions put on for the Detroit Tool Engineers.

Even from a casual viewpoint, it was

(Continued on following page)

# Uncanny Accuracy

Glamour in cotton! The textile industry finds many uses for Dumore grinders.



Two Dumore No. 9's at work on a production job.



Precision personified! Dumore help produce Pratt & Whitney motors.



While air hostesses popularize air travel... Dumore grinders bring mechanical perfection that greatly increases safety (TWA Photo)



Heavy grinding, internally or externally, to .0001" accuracy, is "right down the alley" for a Dumore No. 12.

The capacitor-start induction-run motor of the Dumore "Chief" delivers a maximum power output for its size and works at constant speed. The "Chief" is available with one external and five internal quills.

A Dumore "Chief" resurfacing a rubber printing ink roller at the George Lovelock Co., East Orange, N. J.



Dumore has developed grinders of uncanny accuracy for the widest imaginable variety of applications. Your Dumore distributor will show you how to reduce labor, spoilage, and overhead. Feel free to call on him... there's no obligation.

**THE DUMORE COMPANY**  
Dept. 221 B RACINE, WIS.

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## PRECISION Grinders



# ALLENS

*Now in the front line*

The new Flat Head Cap Screws developed by ALLEN stand in the forefront of socketed screws, against a background of Allen stand-bys 30 years in the service.

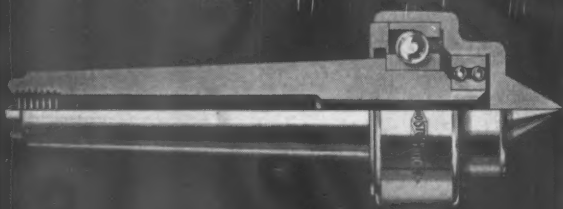
Fast finding their places in the front line of defense production . . . innumerable places where the parts of machines and fighting equipment must HOLD—invincibly.

Technical advantages and specifications are given you in Folder C-25. THE ALLEN MANUFACTURING COMPANY, Hartford, Conn.

## STURDIMATIC HEAVY DUTY

### LIVE CENTERS

ARE



AUTOMATICALLY COMPENSATED FOR  
EXPANSION, SHOCK AND WEAR  
ARE ACCURATE, DURABLE

WRITE FOR CATALOG AND FREE TRIAL OFFER

## STURDIMATIC TOOL COMPANY

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# Columbia TOOL STEEL

### READY TO SERVE—

Our job is producing and delivering good tool steel and giving competent assistance in its use.

Call us if we can help.

*It pays to use  
Good Tool Steel.*

## COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT

GENERAL OFFICE AND WORKS

580 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

## A. S. T. E. DOINGS

(Continued from preceding page)

apparent that the job was a hard nut to crack from start to finish, a credit to the inventors, the product engineers and the engineers who toolled it, not to forget the boys who talked about it. Taken as a whole, it was typical of American technological progress.

Floyd Eaton and Bill Curtis were elected a nominative committee; in their hands rests the new slate. In all, a successful meeting, well attended and well handled.

## Greater New York

The greater New York Chapter held its December meeting in the main ballroom of the Hotel Governor Clinton on December 9. Mr. Orchard spoke briefly regarding the membership campaign which was being conducted and stated that it was the aim of this Chapter to secure enough new members by the annual meeting to bring the total up to 300. He stressed the need, however, of keeping up the standard of membership qualifications. He also announced the forthcoming dinner-dance and entertainment to be held on January 24, 1941, and the appointment of Mr. John Hogan as Vice Chairman of the

Chapter and Chairman of the Meetings Committee to take the place of Mr. Harold Blye who resigned because of the pressure of other duties.

Mr. Hogan then introduced the speaker of the evening, Colonel Crosby Field of the New York Ordnance District Office of the United States Army. Colonel Field gave a most interesting and informative talk on the subject of "procurement for National Defense", in which he described the organization of the War Department, ordnance district procedure for inspection, procurement, establishing priorities and other details in connection with the work of the Ordnance Department. He also spoke briefly about the various strategic and critical materials which would be needed in time of war. There was a half hour question period after his talk and considerable interest was evidenced by the questions asked.

The drawing for the door prize was won by Mr. Charles Edgar of the Otis Elevator Company.

## Hartford

The Hartford Chapter held its regular meeting at the Hotel Garde on January 6. There was the usual fine attendance, there being 140 present for dinner and 200 for the technical session. At the dinner an interesting talk was given by Mr. A. L. DeLeeuw, whose subject was "Mental Attitude in Engineering."

The meeting was then turned over to the meeting chairman, Mr. James N. Skinner, who presided at the technical session and introduced Mr. W. C. DeGraff of the Warner and Swasey Company, who spoke on the subject "Turret Lathe Tooling."

Mr. DeGraff briefly told the history of turret lathes and showed a number of interesting slides on tooling, particularly on national defense jobs. The question period was lively and brought out a number of good discussions.

## Milwaukee

The Milwaukee Chapter met December 1 at the Boy's Technical High School in Milwaukee. Mr. Heywood, director of the Boy's Glee Club was introduced and the Glee Club put on a fine entertainment. After the singing, Mr. T. C. Brown, Principal of the Boys Technical High School was introduced and made an address of welcome.

The meeting then adjourned to the auditorium where Mr. Roy Radtke gave a splendid talk on how "Industrial arts contribute to the Defense Program."

Mr. Fred Zuegenhagen then spoke on how "Trade Education contributed in the Defense Program," which was a splendid talk.

After the speeches, a plant visitation was made, taking visitors through the

(Continued on following page)



# A

## DEPENDABLE SOURCE OF SUPPLY FOR YOUR DEFENSE PROGRAM

TUNGSTEN CARBIDE TIPPED TOOLS  
OF ALL TYPES

VISIT OUR BOOTH NO. 133 AT THE A.S.T.E.  
TOOL SHOW, IN DETROIT, MARCH 25 TO 29

# SUPER TOOL COMPANY

21650 HOOVER ROAD

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HIGH SPEED CENTERS.

on lathes and grinders by use of RED—"E" centers which have high speed steel ends.

Keep machines operating at higher speeds and increased output.

The RED—"E" Outlasts 10 carbon centers  
Write for prices and Catalog E41

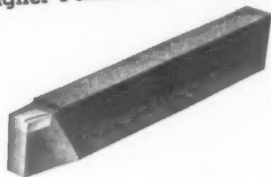
## THE READY TOOL COMPANY

585 Iranistan Avenue  
Bridgeport, Conn.

YOU GET THESE *Extra Values*  
in KENNAMETAL Steel Cutting  
CARBIDE TOOLS

**At no greater cost!**

- 50% Greater Break Strength
- More Resistance to Cratering
- 2/3 Higher Permissible Feeds



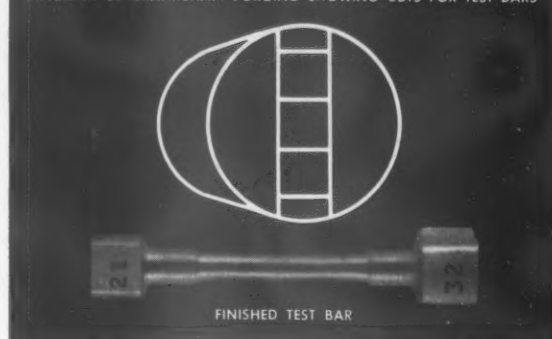
- 2 to 5 Times Longer Life Between Tool Grinds
- More Efficient Tool Angles

Despite these definite advantages, KENNAMETAL costs no more than ordinary carbide tools. Write for latest catalog and price list.

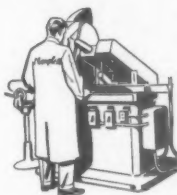


FEBRUARY, 1941

DIAGRAM OF CRANKSHAFT FORGING SHOWING CUTS FOR TEST BARS



## 75% reduction in cutting time with CAMPBELL CUTAMATICS



This was a crankshaft job—a real production job. Tests required bars from the center section of each forging. Time for preparing the test bars became the bottleneck.

Campbell Cutamatics reduced time 75% by making faster, cleaner cuts—getting better specimens from center of shaft—speeding set ups.

Fewer Cutamatics did more work in less time at a big saving—and kept production on an even keel.



### IMPORTANT DEFENSE JOBS CUT ON CAMPBELL MACHINES.

#### CAMPBELL ABRASIVE CUTTING MACHINES

Aircraft Crankshafts  
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#### CAMPBELL NIBBLING MACHINES

Aircraft Alloy Sheet Stock  
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Write for booklet "Design for Cutting Costs." It may contain a solution to your own cutting problems.

#### ANDREW C. CAMPBELL DIVISION

Designers and Builders of Special Machinery  
BRIDGEPORT, CONNECTICUT

*In Business for Your Safety*



AMERICAN CHAIN & CABLE  
COMPANY, Inc.

## A. S. T. E. DOINGS

(Continued from preceding page)

Boy's Technical School Departments. This closed the proceedings for the evening.

### New Jersey-New York

The regular January meeting took place on January 14, at the Essex House in Newark, New Jersey. After the usual dinner and a short business session a large audience of members and guests were treated to a talk by Mr. James R. Longwell, Chief Engineer of the Carbide Company, on "Steel Cutting with Car-

bide Tools," which was illustrated with many excellent slides. All this and the importance of the subject caused a lengthy discussion during question periods, during which Mr. Longwell imparted a great deal more practical information on Carbide Tools than it is possible to simply remember later on when tackling design or production problems. The courtesy of U. S. Tool Company, of Ampere, New Jersey, provided the showing of a beautiful color film—"A Trip Through Florida."

### Philadelphia

The regular meeting on January 16 was

one of those winter nights with the weather against us but proved to be a most enjoyable night. There was an attendance of 70 at the dinner. During the dinner our past secretary, Edward Glenn, led the singing. Mr. Glenn surprised the chapter by having the main speaker of the evening, Mr. Spencer B. Terry, sing "On the Road to Mandalay" and "God Bless America". The members enjoyed this treat.

Mr. E. LeRoy Mercer, Jr. presented a motion picture film showing Fire Prevention methods, sponsored by the Atlantic Refining Company, for a coffee talk. This instructive talking film was appreciated by all especially by some of the manufacturers who were present.

At the evening meeting there were 96. Mr. Terry, Chief Gage Engineer, Pratt & Whitney Company, Hartford, Conn., spoke on "Modern Gaging Practice." It was a real lecture, illustrated with pictures and exhibits. Also present at the meeting were members of the Tool & Die classes from the Spring Garden Institute which are sponsored by our chapter with instructors picked from our members.

### Racine

The Racine Chapter held its meeting on December 9 at Hotel Racine. The Chapter was pleasantly surprised by the presence of Mr. Ford R. Lamb, National Secretary of the A. S. T. E. Upon being introduced by Chairman Zaber, Mr. Lamb brought greetings from the home office in Detroit, and briefly described the activities of the recent Cincinnati meeting. He also announced with enthusiasm the coming convention to be held in March, and he promised that it would be the biggest and best ever.

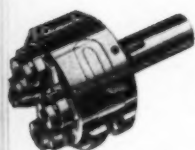
Mr. Zaber then introduced the speaker of the evening, Mr. L. M. Benkert, Work's Manager of the Progressive Welding Company of Detroit, Michigan. Mr. Benkert, with the aid of lantern slides, made a thorough and practical explanation of the theory of "Spot-Welding", his subject for the evening. He also explained the uses of various equipment for Spot-Welding, and described experimental equipment being developed by his company.

The meeting was adjourned at 9:45 p.m. with a rising vote of thanks to Mr. L. M. Benkert.

### Rochester

The American Society for Metals joined with the local Tool Engineers for their January meeting. The seventy-five who sat down to dinner at the University of Rochester not only enjoyed a good meal, but an appropriate talk on the vulnerability of this area from the military point of view. Mr. Paul S. Rice gave the coffee talk and with it showed movies of the local 121st Cavalry unit at home as well as at last summer's war games in the

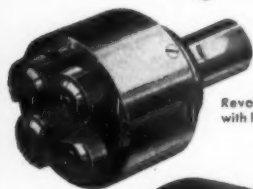
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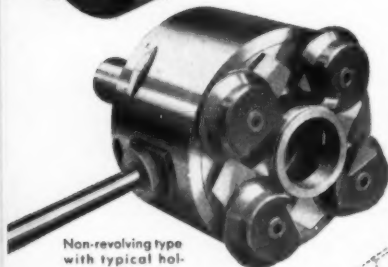
Revolving type with hollow mills for Brown & Sharpe Automatics.



Non-revolving type with ground thread circular chasers.



Revolving type with hollow mills.



Non-revolving type with typical hollow milling job.

## They all use both . . . CIRCULAR CHASERS OR HOLLOW MILLS

With these circular cutter type Namco Self Opening Heads you can change from precision threading to end turning, and forming or necking operations simply by changing cutters and blocks.

- How Namco Precision Heads give 3 Important Savings**
- 1—Not only are chasers and cutters used in the same head, but both are interchangeable between revolving and stationary types of the same cutting range.—Two important savings in tool investment.
  - 2—Namco circular chasers, or milling cutters, are sharpened and checked on their blocks and replaced in the head with certainty that the work will be identical with that cut before grinding—saving time and scrap loss.
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Whether for precision threading, hollow milling, or both, let us show you how much these "double duty" tools will save and earn on your work.



How Circular chasers multiply cutting life . . .



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ACME-GRISLEY 4-B AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

Ask for this 64 page book.



# SPEED

## Plus Micrometer Accuracy!

A leading manufacturer puts a Haskins Type C Tapper to work tapping the 40-pitch thread in the frame of his micrometers. What happens? *Not only are these most exacting of precision standards being met, but production is actually doubled!*

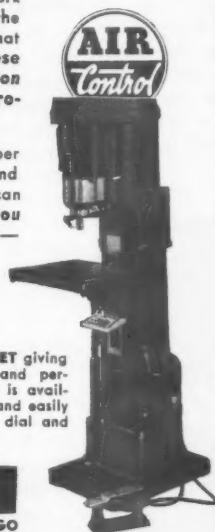
With this *air-controlled* tapper on the job, Class 3 and 4 fit—and high production schedules—can be consistently maintained. If you want *both* speed and precision—if you want lower tapping costs and faster tapping production—get all the facts on the Haskins Type C Tapper.

WRITE FOR FREE BOOKLET giving complete specifications and performance data. Type C is available in three capacities and easily adaptable to magazine, dial and hopper feed operations.



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## SELLERS Duplicate Tool Grinding SAVES TIME—is more ACCURATE



Manufacturers are saving many valuable man-minutes with Sellers automatic method of duplicate tool grinding which produces and reproduces practically any straight or curvex form to exact specifications by following a template cam.

If you want to save time in tool grinding—and lower tool costs too—investigate Sellers Tool Grinders today.

**William Sellers & Co., Incorporated**  
1626 Hamilton St., Phila., Pa.

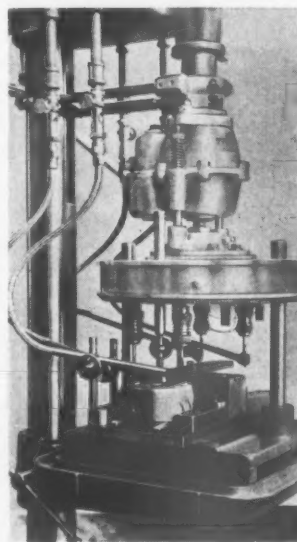
# Sellers

FEBRUARY, 1941

## Here's the *quick, low-cost* way to tool up for **MULTIPLE TAPPING or DRILLING!**

A complete tapping or drilling head tailored from **stock parts** to fit your specific job—that's the exclusive Ettco-Emrick system which enables you to tool up for multiple tapping or drilling in the shortest possible time and at low cost.

You send us a drawing or sample part giving center distances and all essential tapping or drilling data. We do the rest.



### OUTSTANDING FEATURES

- The standard Ettco-Emrick friction clutch driving unit with ball-bearing face plate—the same that has earned for Ettco-Emrick Tapping Attachments and Tapping Machines a reputation for positive, yet extremely sensitive, accurate performance. The feature of a single central friction clutch is an important advantage in multiple tapping and drilling.
- Interchangeability for tapping and drilling by simply changing face plates.
- Tap holding chucks specially developed for multiple tapping which provide vertical adjustment and "float" the tap.
- A design and construction that assure accurate work and unfailing service over a long period.

### THIS IS IMPORTANT

For best results in multiple tapping or drilling a work holding fixture is needed which permits rapid progressive feeding of the work and automatic location in perfect alignment. *We do not make these fixtures—but we do know from long experience how to design them and are prepared to make recommendations on specific jobs.*

### GET FULL DETAILS IN BULLETIN No. 3

This illustrated bulletin tells all about the time and money saving Ettco-Emrick system of "tailored to fit" multiple tapping and drilling heads. Write for a copy today.

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The Famous **Ettco-Emrick** DRILL CHUCKS • TAP HOLDING CHUCKS  
TAPPING ATTACHMENTS • TAPPING MACHINES  
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS  
*Unexcelled for Design, Materials and Workmanship*

## A. S. T. E. DOINGS

(Continued from preceding page)

Ogdensburg, N. Y. section. Seventy-five per cent of the vital (from the military standpoint) industrial area is covered by an area described by a 500 mile radius centering at Elmira, N. Y., according to Mr. Rice. Were the war games held in Northern New York because of the possible invasion into this area by way of the St. Lawrence River? Mr. Rice left the impression they were.

Adjourning to Lower Strong Auditorium the meeting proper was called to order by Chairman John Dense. Mr.

Walter Morton, Chairman of the Steel Treathers gave a short talk before the speaker was introduced.

Mr. W. M. Evarts, Engineer of the E. W. Bliss Company, Brooklyn, talked on the plastic working of metals. Mr. Evarts pointed out that plastic working of metals was nothing new. In fact, coins of over a thousand years ago were definitely a result of plastic working.

Mr. Evarts had an interesting but rather technical talk. Much was said via word and chart covering the theoretical aspects of punch press operations, and we are afraid a fairly large percentage of the 175 odd listeners were disappointed in not hearing more about the practical

application of this interesting subject. Mr. Evarts had a very interesting film showing a number of the mechanical as well as hydraulic type presses under operation. To top off the evening he showed a can-making process which gave a comprehensive picture of this important operation.

## Rockford

The regular meeting for December 5 was called to order at 6:45 with a dinner attendance of 149 men, members of our Chapter and of the Rockford Navy Club who cooperated in presenting as a dinner speaker, Chief Machinist's Mate Harry P. Warren, who is the local Naval Recruiting Station Head. He was introduced by Mr. Thorsell, head of the Navy Club, who also gave a short talk on the aims of the local club. Entertainment was furnished by the Honolulu Conservatory of Music.

The dinner talk was "Opportunities for Technical Training in the Navy." Mate Warren told how a sailor learns by actual experience the various phases of running a ship. Machinists on board a ship must be capable of making repairs to at least get the boat back to shore in case of emergency. Many interesting questions pertaining to the Navy were answered by Mate Warren, before the recess was called at 8:10, allowing those present to revisit the exhibits in the South Ballroom.

Mr. Earnest Flanders of Jones & Lamson spoke to 250 men on "Thread Grinding." He explained how the "comparator" was devised to study thread elements, form, and lead. The aviation industry was instrumental in bringing out the thread grinder commercially, one that grinds threads of any shape and of high production. Since first coming out there have been big changes in grinding wheels, coolant, and Ball Bearings. The talk was illustrated with slides, and many interesting questions were asked of Mr. Flanders.

In checking the crowd it was noted that 7 men were Navy Club Members. Fourteen men came from Beloit, Wisconsin, representing Besly Grinder Co., and 5 came from Freeport, Illinois, as well as many from Chicago. Leo Reuland, Vice Chairman, was in charge of the meeting, and did a fine job.

## Schenectady

The regular monthly meeting of Schenectady Chapter was held Monday evening, January 13, with a dinner attended by over 100 members. At a brief business meeting conducted by Chairman Fred Diehl, Messrs. C. H. Borneman and J. A. Staehle were elected to the nominating committee. N. Y. Cox was elected secretary of the chapter to fill the unexpired term of D. G. Saurenman who has resigned because of his recent transfer to

## SPEED CASE & STEEL

A LOW CARBON OPEN HEARTH PRODUCT

Assures You...

### 1. INCREASE PRODUCTION

40% to 80% Over SAE X1020 - X1314, etc.

### 2. MACHINABILITY

Machines as fast as SAE X1112

### 3. CARBURIZING

Carburizes like SAE X1020

### 4. PHYSICAL PROPERTIES

Equal to SAE X1020 - X1315 - 1115

### 5. UNUSUAL DUCTILITY

180° Bend (Cold Drawn)

### 6. SMALLER INVENTORY

Due to Versatility of Speed Case

#### • SPEED CASE

A low carbon, open hearth case carburizing steel of unusual ductility. Physical properties high. Shock value excellent. Cold drawn - 70 to 85,000 P. S. I. Tensile - 60 to 75,000 yield - 17% to 22% Elongation - 52% to 60% Reduction of area.

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PECKOVER'S LTD., Toronto, Canadian Distributor

## THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD DRAWN CARBON AND ALLOY STEEL BARS

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Our whole Business is Building . . . .

**HYDRAULIC**  
MACHINERY  
POWER PLANTS  
PIPING  
SPECIAL VALVES  
TRANSMISSION UNITS  
(variable speed)

**EXPERIENCED      DEPENDABLE**

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**HYDRAULIC MACHINERY, INC.**

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*At the Show*

**Plan Now**

To meet  
And greet  
Your Friends  
And Associates

**At the HOST Booth  
No. 136**

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**THE TOOL ENGINEER**  
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American Society of Tool Engineers

**PNEUMATIC GRINDERS GIVE**  
*More Power*



**E-1 AIR GRINDER**  
35,000 R.P.M.  
1/2 Horse Power



**For Large Dies and Drop Forgings**

Why be satisfied with slow, inefficient tools? The Onsrud E-1 Grinder cuts time of many heavy duty DIE grinding jobs as much as 50%! Powerful, vibrationless — maintains full speed even under heavy load. Has impulse reaction type rotor. Full automatic lubrication. Practically impossible to stall, and will not heat up by over loading. Send for free bulletin No. E-1.

Write for  
**FREE**  
Bulletin  
No. E-1

**ONSRUD MACHINE WORKS, Inc.**

3907 PALMER STREET      CHICAGO, ILLINOIS

**MORE SPEED  
LONGER LIFE**  
with PUTNAM END MILLS



In an operation such as that illustrated —milling 3/8" slots in a die block— Putnam End Mills permit the maximum speed and feed. In addition, manufacturing and heat treating methods assure long, trouble-free service. Why not prove to your own satisfaction—by actual use on your machines—that the end mills which do "cut faster and last longer" are produced by Putnam?

**PUTNAM TOOL COMPANY**

2987 Charlevoix Ave. • Detroit, Michigan

## A. S. T. E. DOINGS

(Continued from preceding page)

the Pacific Coast. Mr. Diehl also announced that Mr. B. G. Tang had been appointed A. S. T. E. representative on the Emergency Defense Training Committee of this district and that Mr. R. E. Ellis had been appointed representative to the Educational Committee of the society.

Mr. Thomas W. LaVenja of the U. S. Secret Service Dept., gave an interesting outline of the history and functions of this law enforcement agency. He also

presented a very interesting motion picture depicting the engraving and printing of paper money. His pictures pointed out the many ways in which counterfeit money may be detected by the average person and demonstrated how the public can play an important part in the conviction of persons thus violating the law.

Mr. V. R. Parker of the E. W. Bliss Company showed several reels of pictures illustrating recent developments in the punch press field. Many interesting designs including hydraulic and high speed machines as well as conventional presses were shown in the pictures. Many of these installations included the use of

efficient methods of handling work which were of interest, especially to Tool Engineers who are involved in problems of repetitive manufacture.

## St. Louis

St. Louis Chapter held its regular meeting Thursday January 9, 1941 at the Melbourne Hotel. In the absence of Chairman D. D. Burnside, the meeting was presided over by Vice-Chairman C. J. Sinning. The high light of the evening was the presence of Executive-Secretary Ford R. Lamb who received a most hearty welcome. After a brief business session the members went in a body to the Engineers Club of St. Louis to take part in a yearly joint meeting. To open this meeting Mr. Ford R. Lamb made an excellent talk on the problem of educating help for defense industries. He was followed by Mr. W. H. Wills, Metallurgist, Allegheny Ludlum Steel Company, who gave a lecture on "The Manufacture of High Speed Steels." The lecture was supplemented by movie and slides. The talk and pictures covered the subject in all its phases, from the raw materials to the finished tools.

## Syracuse

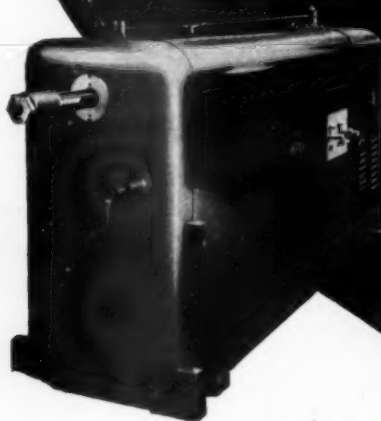
The Syracuse Industrial Club was the scene, January 14, of the regular meeting of the Syracuse Chapter. During the business meeting plans for the coming dinner dance were explained by Joe Owens, chairman of the entertainment committee, and Ray Adams reported on the work of the committee in charge of publicity for the Detroit convention and Machine Tool Show.

The speaker of the evening, Mr. V. R. Parker of the E. W. Bliss Company gave a lecture on "Punches and Dies" accompanied by both slides and motion pictures. The slides and lecture were based on the fundamentals of Crane's Book, "The Plastic Working of Metals," while the motion pictures showed many applications of Bliss presses on the job. It was a profitable evening enjoyed by all.

## Toledo

The January meeting of the Toledo Chapter held January 14 at the Toledo Yacht Club was acclaimed "The finest meeting to date". The program committee again presented an excellent program conducted as an "Information Please" type of meeting with a Board of Experts billed as the "Wise Men", consisting of Messrs. Haynes, Burgess, Hayes, Burke and Lamabe, with Jim McNutt as interrogator. Questions were asked by the audience on problems dear to all Tool Engineers with a ten minute time limit set to discussions on the question by the "Wise Men". Needless to say, discussion ran over the limit in several instances.

## ACCURATE BORES IN WIDE RANGE OF DIAMETERS AND LENGTHS



*now brought to you through this*

## EMPCO HONING MACHINE

### Ruggedly Built for MODERN EFFICIENCY

- Recognized for its exceptional accuracy, capacity, and simplicity.
- Can be changed from one job to another without trouble or extra time.
- In honing blind holes, stroke can be controlled within decimal.
- In many instances, grinding can be eliminated; work can be finished right from boring operations.

The result of many years' research and development—proved through more than 3 years of practical use—the Empco presents the last word in efficient honing machines.

**TAKES ANY TYPE WORK, ANY SIZE.** Universal in application from 2 to 12 inches in diameter. Conventional or co-directional.

**STROKE TO 57 INCHES.** Horizontal. Correct diametric and axial straightness maintained throughout full length.

**MECHANICALLY OPERATED.** Versatile. Easily adapted for production or tool room work.

These and many other advantages are built into the Empco Honing Machine according to the high standards and methods that have produced Empco products for 15 years.

Prompt deliveries can be made under present conditions.

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At the show in March, we will occupy booth 173—and our shop will be open, as always, for your inspection. The men at our booth will furnish transportation.

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**LaSalle**  
Design

We are saving from 25 to 40% on the manufacturing time for some of our accounts on National Defense Programs—let us plan your production to the best advantage of your tools as well as handling the designing of them—Ask us for particulars.

**LASALLE DESIGNING CO.**  
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CHICAGO ILL.

In fact the first question of the evening was one unanswered from the December Quiz Bee program, and one which all five of the "Wise Men" expounded upon, presenting a very satisfactory solution.

The "Wise Men" at times did not quite agree among themselves to the delight of the audience.

Next month still another version of the information type program will be offered with the questioner and answerer sharing in cash prizes.

#### Tri-Cities

The Tri-Cities Chapter held its regular monthly meeting on January 8, at the LeClaire Hotel, Moline, with 132 engineers present.

The speaker of the evening was Mr. J. D. Trethaway, Sales Manager of the Cerro de Pasco Copper Corporation. The subject of Mr. Trethaway's address was "Uses and Application of Cerro Matrix, Cerro Base, and Cerro Bend." His talk was illustrated with slides showing many of the applications of these low melting point alloys.

During the meeting, Professor Thomas Caywood of the University of Iowa at Iowa City was introduced and explained to the group the proposed course of instruction to be conducted in the Tri-City area for tool designers and Tool Engineers.

#### Twin City

The Twin City Chapter met December 18 with the local Chapter of the American Society for Metals in a joint dinner and technical session. The meeting was held at the Coffman Memorial Union of the University of Minnesota. About 80 sat down to dinner and the good old A.S.T.E. had a majority. Numerous others came later for the lecture. Dr. Mario Martellotti of the Research Department of the Cincinnati Milling Machine Company spoke on "Machinability." The lecture was illustrated by colored movies and slides. This was a highly interesting talk and considerable discussion was invoked.

#### Western Michigan

The Western Michigan Chapter held its regular meeting on Monday, January 9 in the Browning Hotel in Grand Rapids. The meeting, a supper meeting, was attended by 55 members and their guests. Mr. Cloud, program chairman, acted as toastmaster. The main speaker of the evening was Mr. Miller of the New Products Company. Mr. Miller, who is a specialist on die casting, confined his talk to Zinc Die Casting. He brought several sample castings and one die casting die along for personal inspection. Besides discussing the advantages of zinc castings, he gave the cost of each part and the cost of the dies to the purchaser. Several ques-

(Continued on following page)

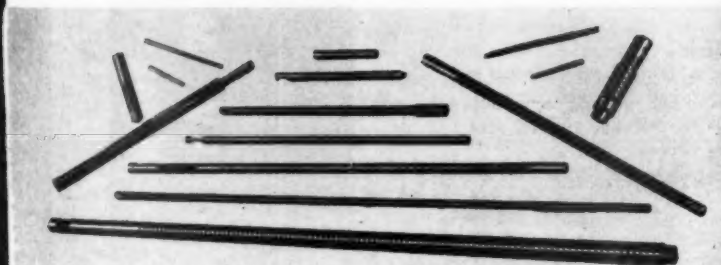
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**A TOOL OR MACHINE for PRACTICALLY Every REQUIREMENT**

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AND WE'LL GLADLY DISCUSS THEM WITH YOU**

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### 150% LONGER LIFE

V/T Super Bond is the most important development in mounted wheels in 30 years. Does work faster and better. Won't ridge on welds, sharp corners, sinking dies, barbering, etc.

**TRIAL WHEEL**—Tell us kind of job, type of equipment you use and size wheel and we'll send you one to try out.

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For jobs beyond the capacity of the Handee, nothing compares with the HI-POWER invibrationless performance, precision and stamina. 17,000 r. p. m. with ample power to drive a 2½" diam. wheel. Wt. 3 lbs. In wood case with accessories, \$35.00.

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Grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. 25,000 r.p.m. Wt. 12 oz. \$18.50 with 7 Accessories.

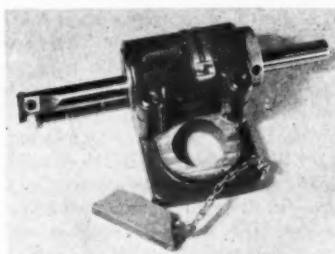
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Free Trial

## EVEREDE BORING BAR HOLDERS



The Everede Boring Bar Holders are adjustable to fit various size lathes. (Bushings are furnished with each boring bar for use in the Holders.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits.

The No. 1 Boring Bar Holder is used on precision bench lathes from 7" swing to and including 9".

The No. 2 Holder is used on engine lathes from 8" swing to and including 12", and the No. 3 Holder on engine lathes from 12" swing to and including 24".

The Holders are made of case-hardened alloy steel. A tool post block is attached to the engine lathe Holders by a chain as shown.

Send for descriptive folder.

**EVEREDE TOOL CO.**

Willis Stutson

184 N. WACKER DRIVE, CHICAGO

Representatives in principal cities

## A. S. T. E. DOINGS

(Continued from preceding page)

tions were raised as to the harm or advantage of copper, aluminum and lead in the metal, also regarding plating and painting of zinc castings.

After the meeting, everyone agreed that Mr. Miller gave a remarkable talk and demonstration on zinc die castings, their dies, and casting machines.

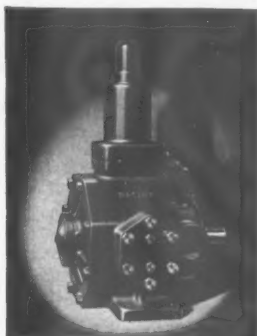
### Worcester

The annual meeting of the Worcester Chapter of the A.S.T.E. was held January 13, at Putnam and Thurston's. The meeting was preceded by a dinner at which gifts supplied by various New England plants were distributed to the members attending. During the dinner Art Starrett led the gang in singing "God Bless America." Entertainment was supplied by a White Entertainment Corporation troupe of Boston through the guidance of Al Freede, master of ceremonies. The show opened with a song and dance by the Darling Sisters followed by George Watts, tap dancer. After the troupe performed, Lane, the magician, came on and kept the boys guessing with his sleight of hand tricks. After the entertainment, door prizes were distributed. Art Starrett won a set of drills, Herb Ramsdell won a blanket and did an impromptu war dance. All the boys got a prize and a few lucky ones got two. A rising vote of thanks was given Henry Merrill for his excellent work in supplying the evening's entertainment.

### Tri-Cities

At a meeting of the Tri-Cities Chapter, American Society of Tool Engineers held at the LeClaire Hotel on January 8, 1941, Professor Caywood of the University of Iowa at Iowa City explained to the Tri-Cities Chapter that the University of Iowa had been appointed to sponsor the government educational program in the Tri-Cities Area. This program will train tool designers and Tool Engineers. Professor Caywood has been appointed by the University to supervise the arrangements for this program locally. According to Professor Caywood, no complete plans have been made, however, it is believed that the course will be a 16-weeks concentrated instruction divided into several classes, depending upon the instruction desired and the number of men desiring this instruction. The proposed course will be financed by the Government, with the exception of the cost of text books. Instructors for the course have not, as yet, been selected. However, efforts are being made to secure the best possible men qualifying as experts in the field of tool designing and Tool Engineering.

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**HYDRAULIC POWER AT LOW COST**  
FOR Forcing, Straightening, and Bending • Die Casting • Plastic Moulding • Machine Tool Applications • Lifts and Elevators • Mining Machinery • Stokers • Excavating and Materials Handling • Welding • Embossing and Die Sinking • And many other special applications.

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In Capacities • 12-20-30 gal. per min. Of Variable Pressures—up to 1,000 lbs. per sq. in. RACINE Variable Volume Hydraulic Pumps automatically maintain any desired pressure up to 1,000 lbs. per sq. in. without by-passing of oil. Their use means less Horse Power Consumption—Minimum of Oil Heating—Least Noise.



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Engineers and designers, you are offered a complete service for oil hydraulic systems—Variable Volume pumps—Feed controls—Pressure regulators. A complete line of hydraulic valves—Manual—Pilot—or Electrically operated. Let RACINE assist you with your hydraulic problems.

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# GROUND To Give Keenness

these Midget Cutters often give 7 to 10 times the increase in production per dollar of tool cost.

And what's more — **Severance** guarantees that they will give from 3 to 5 TIMES more production per tool—and keep on doing it every time they are reground.



**So!  
Cut Your**

Rotary Filing costs like one  
\*Chief Executive who writes,  
"It will cut our tool costs  
at least three-quarters."

Write for Catalogue No. 12.  
Every Tool Man—Supervisor,  
Engineer or Designer—will  
want this little booklet, so  
pack full of time and money-  
saving ideas.

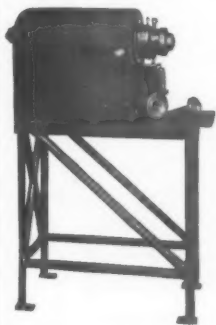
Profusely illustrated, it shows  
many unusual cutters and  
applications, lists Standard  
Midget Milling Cutters,  
"Chatterless" Countersinks,  
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## SCHAUER Speed Lathes



for  
speedier  
grinding  
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filing  
polishing  
small  
parts

with  
3 or 4-jaw  
chucks  
or  
hand or foot-  
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## Variable Speed Lathe

Any desired spindle speed, while running—from a minimum of 75 to a maximum of 5,000—at a ratio of 6 to 1 with single-speed and 13 to 1 with two-speed motor! Smooth-operating; no "jumps", no "steps!"

Equipped with Standard NEMA frame motor; exclusive, automatic braking system, with rapid, positive, velvety stop. Lost time, due to slow stopping, completely eliminated!

We provide engineering service for adapting Schauer Speed Lathes to any special production needs. Write for Bulletin No. 400.

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Much equipment is semi-obsolete today.

We are in position to help modernize for today's tempo.

Inquiries solicited.



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## FOR MARKING ROUND SURFACES SAFETY Wedge Grip Radius Holder

This holder is constructed so that it can be easily adjusted for use on any radius. Interchangeable curved slides are provided for each radius to be marked.

The special type is of an exclusive design and can be used in ALL of the dif-



Pat. applied for

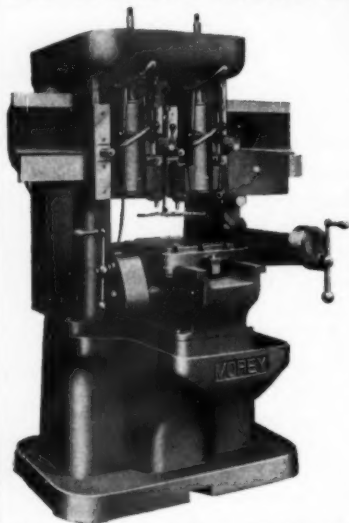
ferent radius slides. Each unit of type strikes the surface at the correct angle to give perfect marking.

Holder and type are made from our SAFETY STEEL to eliminate spalling and mushrooming and to give increased service.

Write for prices and literature.

**M. E. CUNNINGHAM CO.**  
169 East Carson St. Pittsburgh, Pa.

## MOREY No. 12M High Speed Vertical PROFILER and MILLING MACHINE



Many new features speed up manufacture of small parts—increase accuracy. Unique table design gives twelve inch maximum working space.

**INVESTIGATE!**

Write for Bulletin 12M

**MOREY MACHINERY CO., Inc.**  
410 Broome Street, New York, N. Y.

## THE Passing Parade

D. A. Wallace, President, Chrysler Division, and 'father' of the Superfinishing process has been appointed by the A.S.T.E. to represent that organization on the committee dealing with the classification and designation of surface qualities of the American Standards Association.

Ray H. Morris, for the past eight years with Hardinge Brothers, Inc., of Elmira, N. Y., has been elected Vice-President of that company and will be in charge of the Hartford branch. Mr. Morris is a member of the A.S.T.E., the A.S.M., and the Hartford Engineers Club.



**ASTE'er Morris**  
Becomes a vice president.

M. K. Peck, William Sellers & Co. representative in the Cleveland Area has been recalled to the home office to aid in production problems involved in the orders in connection with the defense program.

Clifford E. Ives, head of the Ives Engineering Laboratories, reports that they have moved into new quarters at 216 N. Clinton Street, Chicago, Ill.

James R. Weaver has been appointed manager of the government ordnance plant which is now being built in Louisville, Kentucky, and which will be operated by Westinghouse.

R. V. Gavert has been named manager of the Canton, Ohio ordnance plant, also to be operated by Westinghouse.

Ampco Metal has recently promoted a number of sales engineers. J. K. Bybee will handle the Michigan territory, E. A. Svoboda has been transferred to the In-

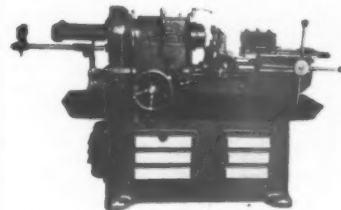


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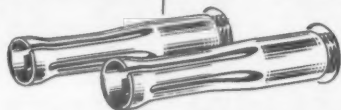
Range 90 to 1800 R.P.M.  
or 180 to 3600 R.P.M.

Designed for high-speed turning on small diameters using Tungsten Carbide and diamond tools. 1" wire feed capacity — 6 1/2" turning length. Motor drive. Ask for descriptive bulletin.

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## Against ALL FORMS of FEED FINGER TROUBLES



Uninterrupted production is today's first objective in arming this country for defense. By the use of Modern Pushers, the troubles often encountered through the use of other type feed fingers are virtually eliminated.

No other feed fingers possess the features of patented steel, Modern Pushers. Through their use, any shop can reduce its tool inventory, for only one is needed for round and hexagon stock and one for round and square stock. Modern Pushers have a long flat surface grip. They can be tightened, when they become loose through wear, to any desired tension without the aid of special tools. They are unusually long-wearing.

Wherever a highly finished product must be produced without removing stock from the O. D., Modern Pushers made of a special bronze alloy are recommended to eliminate scratching.

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and MACHINE CO.**  
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These are on hand in our Warehouse for Your Inspection.



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FEBRUARY, 1941

dianapolis office. W. B. McKenzie and A. J. Reynolds have been transferred to Chicago. H. R. Gordon takes over in Boston.

George W. Frick has been made manager of the newly created Firthite Division of the Firth-Sterling Steel Company. Mr. Frick was manager of the company's Ohio district for nine years.

Edward D. Gangwere has been appointed director of equipment of the Westinghouse Company. In his new position he will co-ordinate the selection of equipment used throughout the various plants of the company.

Leonard S. Parker, for a number of years superintendent of production for Skilsaw, Inc., has been named Vice President in Charge of Operations.



**Toolman Parker.**  
*Also a vice president.*

R. E. Zimmerman, Vice President of the United States Steel Corporation, was recently elected president of the American Standards Association.

Among the Tool Engineers placed in the new factory branches of Vascoloy-Ramet Corporation are Wilfred Pulver and Clarence J. Busch, who will be located at Milwaukee, C. W. Blade at Hartford, Conn., F. B. Sturm at Detroit, Sam A. Miniea and John Lee at North Chicago.

Francis A. Smith has been named general manager of the Sargent Company, of New Haven, Conn. He had been with the Greenfield Tap and Die Corporation for twenty years and was general manager at the time of his resignation.

James Y. Scott, president of Van Norman Machine Tool Company, has been elected president of the Community Chest board of trustees.

Derick S. Hartshorn, production engi-

(Continued on following page)

## SHELDON BACK GEARED SCREW CUTTING Precision Lathes

Meet new production demands with new 11" and 12" Sheldon Precision Lathes. Though moderate in price, they are quality machine tools, precision tools with modern features.

The U-1236 WQ (Illustrated) comes with 4-speed anti-friction lever-operated, Pedestal Motor Drive. Full Quick Change Gear Box; Large Special Analysis Steel Spindles that are ground all-over, inside and out—even the spindle nose thread is ground; Precision Preloaded Ball or Roller Spindle Bearings, Double Walled Worm Feed Apron with Power Cross Feed and other quality features. Sheldon lathe beds are semi-steel with hand scraped ways, 2 V-ways and 2 flat ways.

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1619 N. Kilbourn Ave. Chicago, U.S.A.



## T. H. L. FRONT LEVER BENCH PUNCH

Built for hard, tough work—die cannot lose alignment with punch—all parts interchangeable.



PRICE WITH ONE  
PUNCH AND ONE  
DIE—

**\$37.00**

Immediate  
Shipment

Capacity  $\frac{1}{2}$ " holes through  $\frac{3}{8}$ " steel;  $\frac{3}{8}$ " through  $\frac{1}{4}$ " steel. Can also be made for holes up to  $\frac{7}{8}$ " in thinner metal. Stock punches and dies available from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " by 64ths.

Weight, 70 lbs.

**T. H. LEWTHWAITE  
MACHINE CO.**

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### CUP DISC FAN PROTECTS MOTOR

A patented cup disc fan built into the upper part of the motor prevents oil or dirt from getting on the motor windings—just another reason why you can expect long and efficient service from Ruthman Gusher Coolant Pumps.



Model No. 11022  
Patented and  
Patents Pending



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Gushers can be throttled to any speed without building up pressure, and they can handle cutting fluids containing grit without danger of injury. Write for complete data sheets.

**THE RUTHMAN MACHINERY CO.**  
542 E. FRONT ST., CINCINNATI, OHIO  
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

## BALDOR BALL BEARING GRINDERS

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WRITE FOR BULLETIN 83  
**BALDOR ELECTRIC COMPANY**  
4335 Dunes Ave. St. Louis, Mo.

**BUILT BY MOTOR SPECIALISTS**

## PASSING PARADE

(Continued from preceding page)

neer at the U. S. Armory in Springfield has been appointed works manager of the Babcock Printing Press Corporation in New London, Conn.

Terrence C. O'Donnell, works manager of Gilbert & Barker Manufacturing Co., has been elected a vice president and director. He has just completed 25 years of service with the company.

### Died

Frank B. Hamerly of Aurora, 53, vice president of the Independent Pneumatic Tool Company of Chicago; of a heart attack while inspecting the company's Los Angeles plant.

Charles F. Drake, 45, Dayton representative of the E. A. Baumbach Co., member of the Dayton Chapter of the A.S.T.E.; after a two weeks illness.

Harry Martin, with the Elwood Tool Company of Detroit; killed by lightning while visiting in Florida.

David Milne, 62, Machine Shop Superintendent of Farrell-Birmingham Company, Ansonia, Conn.; of a heart attack on Christmas morning. Born in Montrose, Scotland, he came to this country in 1907, after having worked for seven years in a Canadian locomotive plant. He was not only an excellent mechanic but also an exceptional leader of men. He was one of the first to recognize the possibilities of high speed steel and also did considerable work with tungsten carbide when it came out.

Frank E. Randall, 80, pioneer in the manufacture of dial gauges and precision instruments; following an operation for a ruptured appendix. He was a 32nd degree Mason, a member of the Order of the Eastern Star and the Waltham Gun Club.

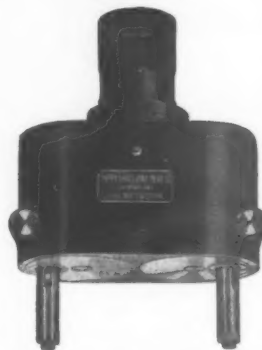
Col. Franklin B. Richards, 78, internationally known metallurgist; after a brief illness. He retired in 1930 as a partner in the Cleveland iron concern of M. A. Hanna & Co. He had been director of many companies, and served during the last War as military assistant to Benedict Crowell, Asst. Secretary of War. At the time of his death he was living in Cambridge, Mass.

Charles H. Osborne, 60, factory superintendent of the Chandler Company of Springfield, Mass.

James F. Sloan, 52, toolmaker and designer; in his home at Worcester, Mass., after a brief illness. He had been an assistant to Prof. Goddard of Clark University, and had accompanied him to California and New Mexico for rocket and telescopic experiments.

Frederick H. Rich, 63, former general manager of Perkins Machine and Gear Company; at Springfield Hospital.

## U S HEADS STANDARD SINCE 1915



30 DIFFERENT STANDARD SIZE  
ADJUSTABLE DRILL HEADS,  
CAPACITIES UP TO 1 1/2" DRILLS

SEND US YOUR B/P'S

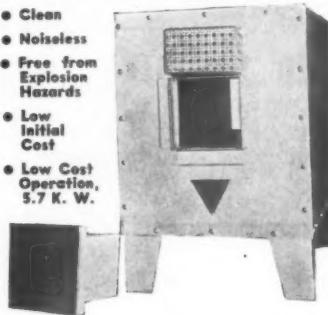
All Types of Fixed Center Heads

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Cincinnati, Ohio

## BENCH MODEL ELECTRIC FORGE

FOR TEMPERATURES TO 2200° F.  
USING NON-METALLIC ELEMENTS

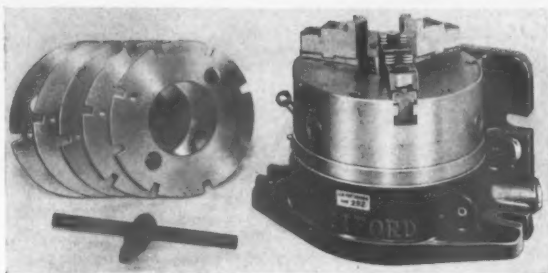
- Clean
- Noiseless
- Free from Explosion Hazards
- Low Initial Cost
- Low Cost Operation, 5.7 K. W.



THE PERECO BENCH MODEL ELECTRIC FORGE has been designed primarily for shops where space is limited and where a top-quality forge for less than \$100. is wanted.

Designed for heat treating up to 2200 degrees F. . . insulated against heat loss with 4 1/2" of insulating refractories . . . this forge will meet the requirements of any shop. Write today for details about Pereco Forges, Crucibles, Annealing furnaces and equipment for special heat treating problems.

**P E R E N Y**  
POTTERY and EQUIPMENT CO.  
842 N. Pearl St. Columbus, Ohio



## Low Cost Indexing

Here is an accurate, fool-proof, fast and efficient spacing device for your milling, drilling, jig-boring, slotting, grinding and other jobs requiring fast, accurate indexing.

It is being used in tool rooms and in production plants with marked success and the approval of Tool Engineers everywhere.

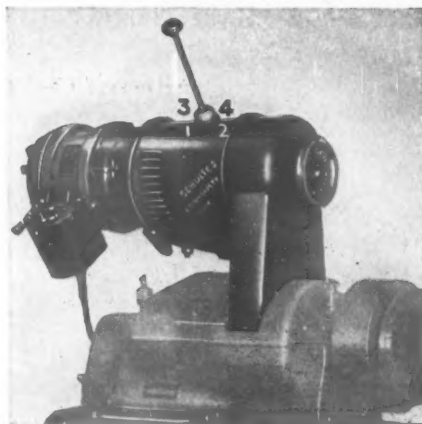
*A practical way to minimum unit costs  
with MAXIMUM production*

**Get the facts—today**

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HARTFORD, CONN.

## NEW ALL-HELICAL GEARED 4-SPEED SCHULTES UNIT

Instant Reversibility



**Features:** For lathes, punch presses, shapers, milling machines, drill presses, etc. One lever synchromesh shift controls 4 speeds. Instant reversibility with all 4 speeds. Adapted to V-belt, flat-belt, chain or direct drive. Hand wheel permits rotation of machine spindle for set-up work with complete safety. Cradle adjustment permits the unit to be revolved to any desired position . . . placing gear shift lever where most convenient.

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## FOR AMERICA'S DEFENSE WORK OR ANY OTHER WORK, UNIVERSAL COL- LET CHUCKS GRIP END-MILLS SECURELY



Universal Collet Chucks use broken or whole straight shank tools. No tang required. Concentric to within .001. Adjusts within .002 depths. Grip as strong as solid steel. Write for complete facts and prices.

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GEAR AND PISTON PUMPS  
CONTROL VALVES  
PANELS AND UNITS  
for  
FEED AND TRAVERSE

HYDRAULIC CIRCUITS  
ENGINEERED TO SUIT  
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## February Meetings

**BOSTON**—Feb. 13. Dinner 6:15, Hotel Lenox, Exeter Street, Boston. H. B. Berry will speak on screw machines. E. I. du Pont movies showing the making of Neoprene. Election of officers. Floor Show.

**CALIFORNIA**—Feb. 13. Scully's Cafe 7 p.m., 4801 Greshaw Blvd., Los Angeles. H. F. Lenz will speak. Quiz Program.

**CLEVELAND**—Feb. 14. Hotel Allerton, Chester & E. 13th St. 6:30. J. Karash of Reliance Electric & Engineering Company will show slides of Western

National Parks. Reservation: Wm. J. Reiff, Jr.

**NOTE:** The Special Tool, Die & Machine Shop Institute of Northern Ohio, will hold their 4th Annual Dinner Dance, March 8th, 1941 at the Cleveland Hotel. Reservation: J. R. Fitzsimmons, Die Supply Company.

**DAYTON**—Feb. 10. Dinner 6:30, Hotel Gibbons. Election of Officers. Information on the 1941 Machine & Tool Progress Exhibition in Detroit.

**HARTFORD**—Feb. 3. 8:00 City Club,

Hartford. F. W. Curtis, Chief Engineer of Van Norman Machine Tool Co., Springfield, Mass. will speak on "Jig & Fixture Design."

**INDIANAPOLIS**—Feb. 27. Dinner 6:30. Meeting 8:00. Warren Hotel. W. H. Wills, Metallurgist for Allegheny Ludlum Steel Company will speak on the Manufacture and Applications of High Speed Steels. Movies will illustrate. Reservation: R. D. Harris, 4201 E. 35th Street, Indianapolis.

**MILWAUKEE**—Feb. 13. Dinner 6:30. Meeting 7:30. Mr. Friedman, V. P. National Machine Co. will give an illustrated talk on "Manufacturing Shells for Defense." Reservation: Julius Riedl, Seaman Body Corp.

**NEW YORK-NEW JERSEY**—Feb. 11. 8:00. Robert Treat Hotel, Newark, New Jersey. Frank Sheeley, Stanley Gruchacz, Charles Thomson and Edward Murphy will conduct meeting on Die Design.

**PEORIA**—Feb. 4. 6:30. Endres Hotel, Peoria, Illinois. Harry Reynolds of Fafnir Bearing Company will speak on Bearing Types, Housing Design & Lubrication. Reservations: Everett C. Bowton, 412 Thrush Ave., Phone 2-6984.

**PHILADELPHIA**—Feb. 15. Penn Athletic Club, Philadelphia. Third anniversary. Exhibits open 10 a.m. Dinner 6 p.m.

**ROCHESTER**—Feb. 12. 7:45. University of Rochester, Lower Strong Auditorium. W. P. Rogers of U. S. Tool Company will speak on "Multi-Slide Presses & Milling Machines. Reservation: C. G. Newton.

**ROCKFORD**—Feb. 6. Dinner 6:30. Hotel Faust. Past President Carpenter of National Automatic Machine Company will relate some of his War Experiences and His Hasty Departure from France Just Before its Fall to the Germans. Reservation: Allis Chalmers, Main 6270.

**SCHENECTADY**—Feb. 10. 6:45. Y. W. C. A., Troy, New York. Reservation: N. Cox, Bldg. 16, General Electric Company, Schenectady, New York.

**ST. LOUIS**—Feb. 13. 6:30. Melbourne Hotel, Grand & Lindell Blvd. Mr. Ellis will speak on Borizing. Precision Finishing of Surfaces.

**SYRACUSE**—Feb. 11. Dinner 6:30. Meeting 8:00. Syracuse Industrial Club. W. B. Ross, Open Forum Discussion on "The Subjects Which Bother Us Most".

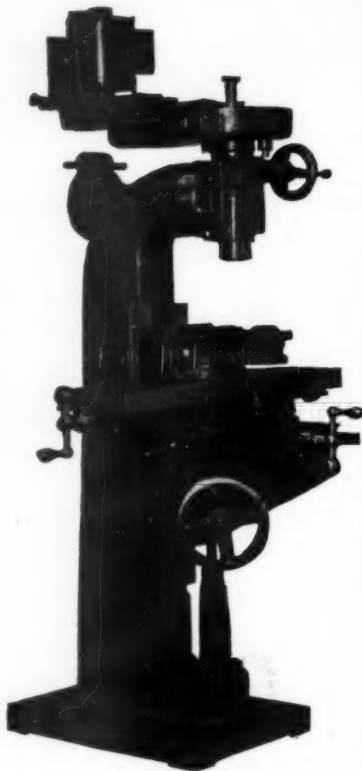
**TOLEDO**—Feb. 11. Dinner 8:50. 6:30. Toledo Yacht Club. "Askit Baskit" with Prizes. Reservation: R. H. Mogle, 3722 Leybourne Ave., Phone La. 8783.

**TRI-CITIES**—Feb. 5. 6:30. LeClaire Hotel, Moline Illinois. A. H. d'Arcambal, President of A.S.T.E. will speak on "Machinability of Metals".

**WORCESTER**—Feb. 10. Norton Company. 4:30 Trip through Plant. 6:30 Supper in Norton Cafeteria. Ray Cole, Experimental Engineer of the Norton Company will speak on "Surface Finishes as Developed by the Norton Company". Movies will follow.

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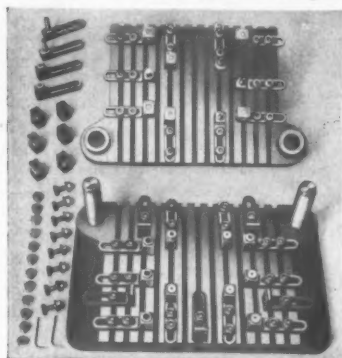
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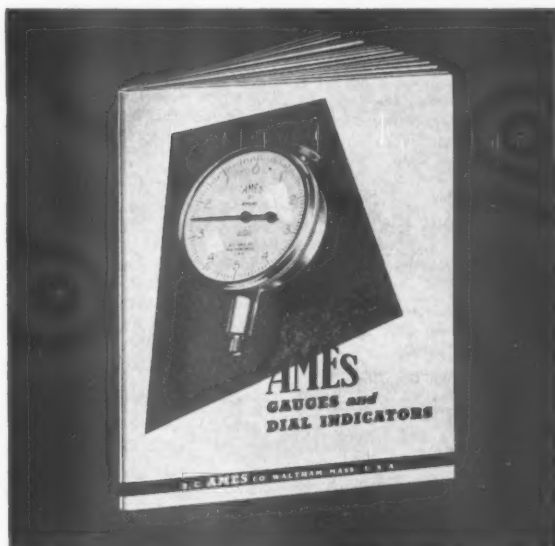
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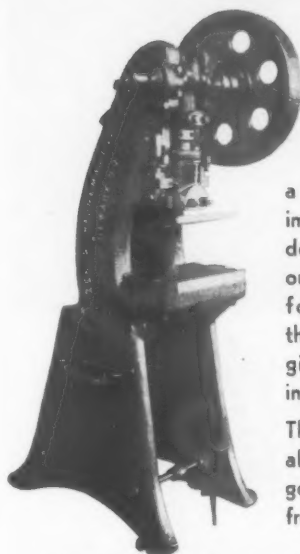


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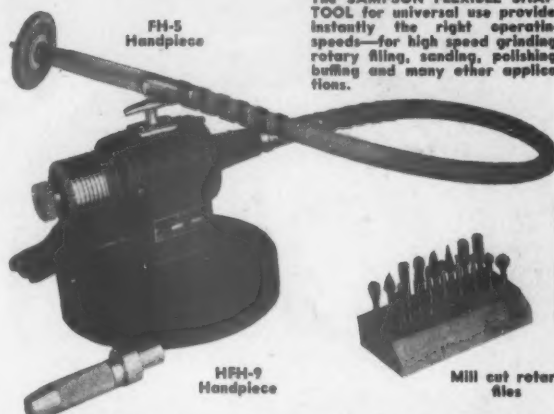
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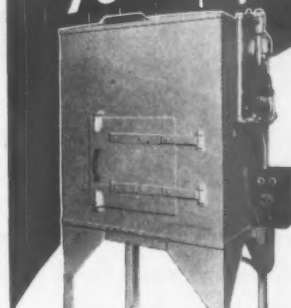
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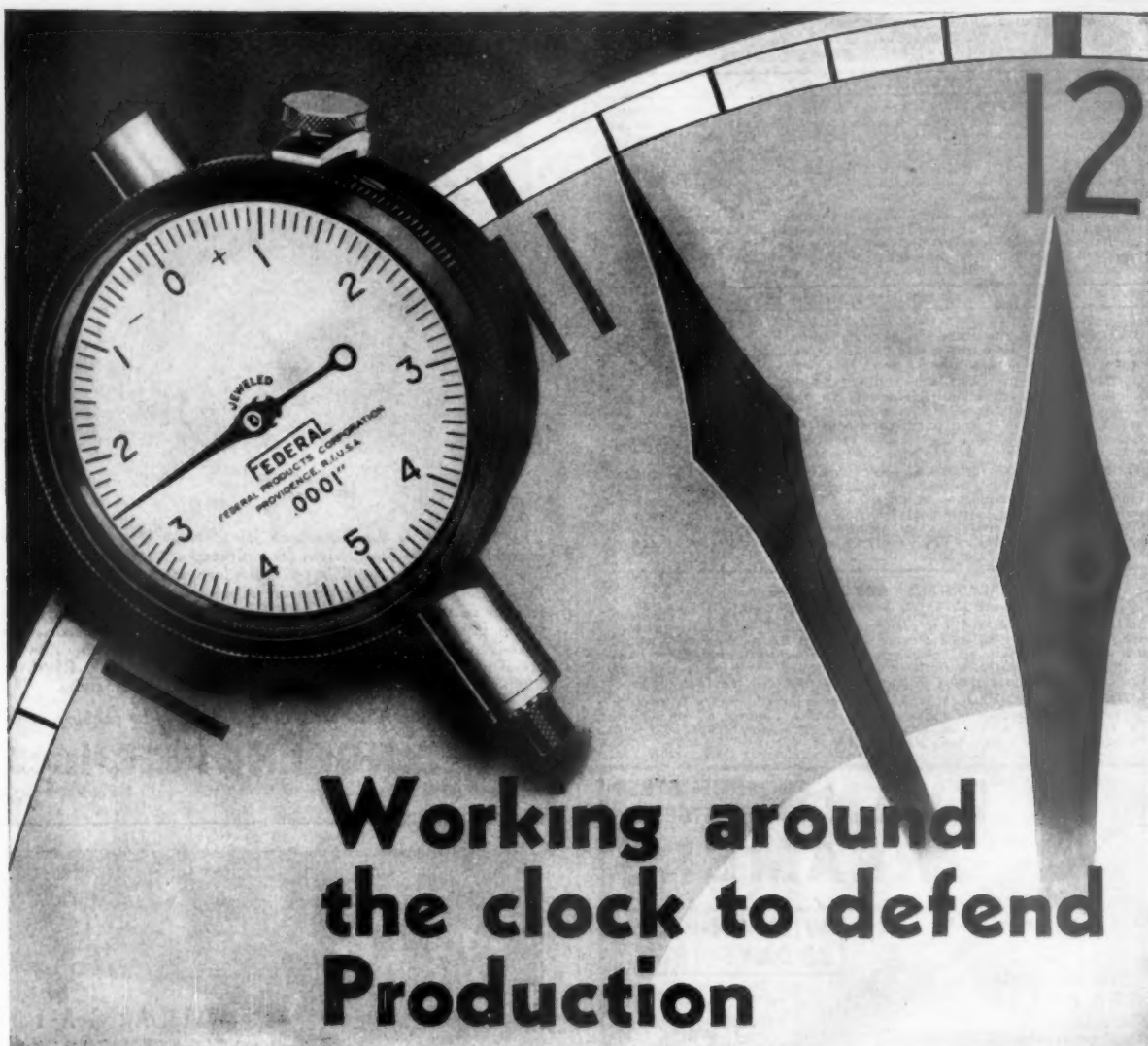
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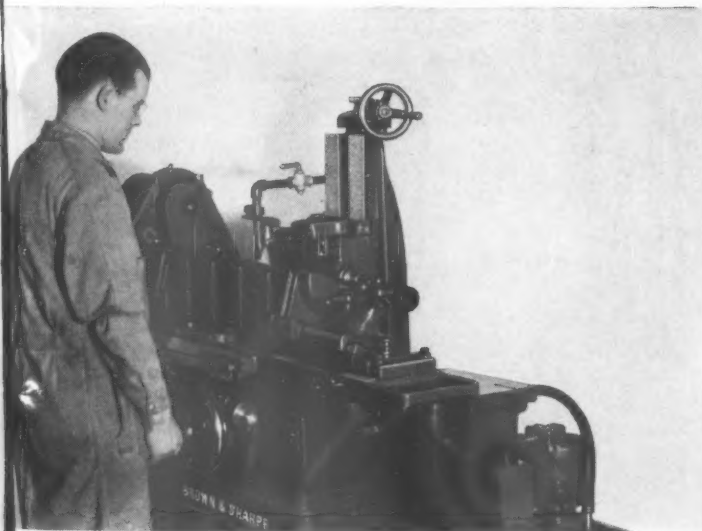
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